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Carboniferous Coal Measures in the Southwest.

BY CHARLES R. KEYES.*

The vast coal deposits of the Rocky mountain region are geologically very much younger than the coal-bearing formations of the Mississippi valley and the Appalachians. The coals of the West are Cretaceous and Tertiary in age, while those of the East are Carboniferous.

Carboniferous coals have been generally unknown in the West, and it is, therefore, of considerable interest that in central New Mexico coals of true Carboniferous age have been recently discovered. As yet the known deposits are quite limited; but their thickness, and geological relationships, show that the formations in which they occur were once very extensive, perhaps rivaling the eastern deposits. They have suffered tremendous erosion which has almost swept away the evidences of their existence. Their stratigraphy indicates a very much greater development. The recognition of their existence, their geological horizon, and their great former extent, is suggestive of much more important deposits than are at present known.

The name of this coal-bearing sequence, the Ladronesian series, is taken from the Sierra Ladrones, near which place, important outcrops of the formation occur. The known area of the coal-bearing series is quite limited; however, it is surmised that the formation will eventually be found widely distributed, though probably in more or less isolated areas. The known exposures are confined to the Rio Grande valley in the Sierra Ladrones, about 30 miles north of Socorro, and also in the foothills of the Sierra Filicia 10 miles east of the same town.

In lithologic character, a marked contrast is presented to the associated rocks, which are limestones. The section of shales as displayed in the Arroyo Alamito, 10 miles east of Socorro, has a vertical measurement of about 100 ft. It consists mainly of gray argillaceous shales with some thin sandstone layers. The best exposure is at the pit which has been opened up for the fire-clays used mainly in the manufacture of refractory ware at Socorro. Lithologically, this section would pass for a good representation of any section of the Lower Coal Measures in the Mississippi valley. A few miles further south the formation is believed to be more than twice the thickness noted above.

Notwithstanding the fact that the vertical measurement of the formation under consideration is so limited, and the area so small, the stratigraphy is clearly displayed. The plane of unconformity on which it was deposited is one of wide extent; it bevels the fundamental complexity of the Archeozoic age, as well as the early Carboniferous strata.

The upper part of the formation, which no doubt was once very important, and of considerable magnitude, has suffered through erosion until it is now nearly effaced. The Mid Carboniferous limestones of the Manzanan series appear to rest directly upon these shales with marked unconformable relationships, wherever exposed.

No animal remains have yet been found in the shales. Plant remains, which are abundant, are chiefly of lepidodendrid types peculiar to the lowest beds of the Des Moines series, and the upper parts of the Arkansas series of Missouri, Kansas, and the country to the south.

As a coal deposit, no workable seams are as yet known in any of the Ladronesian beds. It is not improbable that sooner or later coals of workable thickness will be discovered, especially as the formation becomes better known. The fact that several miles south of the Alamito locality in a drilled well, two coal seams were passed through at a depth of 200 ft. in what appears to be the same formation, goes to show that it is quite extensive. The fire-clays obtained on the Arroyo Alamito are among the most important in the region. The shales are excellent for the manufacture of high-grade vitrified brick.

The recognition of remnants of an extensive coal group in this region, is important because of the possibilities opened up for the discovery of extensive workable coal deposits. The peculiarities of stratigraphy, the obscured character of the outcrop, the nature of the overlying formations, and the unusual conditions of climate have all contributed toward preventing these productive coal measures from being prospected and exploited.

*President, New Mexico State School of Mines, Socorro, New Mexico.

Mexican Mining Laws.

Consul J. A. LeRoy, of Durango, reporting on the possibility of changing the mining laws of Mexico, says that there is talk of a comprehensive revision of the mining laws of Mexico, not with a view to any radical changes, but to make a more harmonious whole of the accumulation of the legislative enactments, executive decrees, etc., that have grown up since 1891; also with a view to certain changes advocated by the mining interests in the matter of fixing of boundaries, size of claims, methods of registration, and payment of claim taxes. The project was right to insist upon conditions which it stipulates with regard to the development of the riches covered by the conveyance.

It is the principle of Mexican mining law, inherited from Spanish law, that the title to mineral riches vests in the State, and not in the individual possessing the surface of the soil, and in granting mineral patents the Government gives the applicant only the right to remove the minerals. In practice a Mexican mining claim, so long as the requirements governing its issue are complied with, is to all intents and purposes the same as title in fee simple. The distinction in principle remains, however, to the extent that it gives the State full authority and control and the right to insist upon the conditions which it stipulates with regard to the development of the riches covered by the conveyance.

This principle of reserving fee simple in the State was abandoned at the time of the promulgation of the present mining law with reference to deposits of coal and oil, the rights to them passing with the title of the surface of the soil. It has been urged that the development of Mexico's coal and oil resources was not proceeding with the rapidity that it would if the large land owners did not possess the title to such wealth underneath them.

The Government has had a committee studying the advisability and the legality of a change of the law in this respect, making coal and oil deposits subject to the same general principles as are other mineral deposits, but the report is understood to have been adverse and the matter dropped.

Magnetite Deposits and Mining at Mineville, N. Y.—V.

BY J. H. GRANBERY.

Power for the operation of the mines and mills is furnished from two steam-power plants, the Central power-house and the Old Bed power-house respectively; two water-power plants, one at Kingdom, and the other at Wadham's Mills are also called upon to furnish electrical energy, and a turbo-generator station is to be built to furnish additional energy. The hoisting plants at the mines are known as sub-stations A B, and the Smith Mine sub-station respectively; the Old Bed power-house includes the hoisting equipment for those workings.

The Central power-house is at the western extremity of the present Mineville workings, but is near the center of distribution between these and the Smith Mine and Barton Hill. When the latter mines, together with the New Bed workings west of the Old Bed and Harmony Mines are opened its position will justify its title. It is situated alongside a pool which may be seen to the right of the illustration, Fig. 1, into which its condensing water is discharged. The water is taken from an abandoned mine through the shaft and is returned to the workings through another shaft about 75 ft. away from the first. Its temperature throughout the year is 42 deg. F. The evaporation loss from the cooling pond is supplied by the small flow of water making in the mines and from a mountain stream emptying into it.

The boiler equipment consists of three Geary water tube boilers, 8 high x 20 wide, with 42 in.x18 ft. drums. The feed water is supplied by an outside packed plunger pump, 10x6x10 in., a Milwaukee feed water heater with 150 brass tubes 1½ in. o. d. 72 in. long, giving 470 sq. ft. heating surface, raises the feed water temperature to 160 deg.

Hand firing is used, bituminous coal being burned. The stack is a self supporting steel one, 84 in. diam.x110 ft. high; unlined. An overhead steel flue leads to this from the back of the boiler. The steam header runs direct from the boiler to a 23 & 46 x 48 in. Nordberg horizontal cross-compound condensing engine, developing 1000 h.p., at 150 lb. pressure and 100 r.p.m. This is shown in Fig. 2, and is direct-connected to a G. E. alternating current generator, class 32-750-94; a three phase 3300 volt 25 cycle machine of the revolving field type. The exciter is a G. E. direct current generator, 4-20-460, operating at 125-175 volts and belted to a pulley on the main shaft. This drive replaces a silent chain drive that was formerly used. The exciter is designed to build up voltage as the load comes on, subject to a Tirrell regulator.

An independent jet-condenser and air pump (32x14 in.) of the Nordberg type is installed in the basement, its steam end projecting above the floor of the engine room for convenient access to its parts. Positive lubrication is provided by a Manzel oiling system. The reservoir for oil is on the wall back of and above the engine, and the flow is by gravity through brass piping which extends from the engine railings. The used oil is filtered and then pumped, by a small steam-driven rotary pump in the basement, back into the reservoir; this holds one barrel and runs for long periods with one filling. Engine oil is used, and the record of last filling, June 18, 1905, will give some idea of the economy effected by this method of lubrication.

Current from the Kingdom water power station at some distance is brought into a monolithic (concrete) transformer house connected with the main building, which is of brick with steel trusses and a corrugated galvanized roof, laid on boards. The current is delivered from the transmission line at 6600 volts, 25 cycles, and reduced, for works transmission, to 3300 volts. Three 125 kw., G. E. type H oil cooled transformers are used as step down transformers in △ connection.

The switchboard, in seven panels, is fitted with a Lincoln synchronizer, a Tirrell voltage regulator, Thomson wattmeter and manually operated automatic-trip oil break switches. Aside from the generator and the exciter panels, one is provided for the AB sub-station and one for the Smith Mine. Another, a "separator" panel, supplies the feeder for Mill No. 2. Two panels are provided for handling the high tension transmission from Kingdom, two other panels in the transformer room are fitted with G. E. lightning arresters and "hook" pull-switches for line and ground connections The Smith Mine panel is used also as receiving panel from Wadham's Mills power station. The usual works transmission is 25 cycle A. C. at 3300 volts, but this is stepped down to 440 volts at the motors; direct current is also used for some lines. Coal is handled by a spur brought in from the main line of the Lake Champlain and Moriah Railroad. The gondola cars are dumped from the top of a timber pocket of 1000 (nominal) tons capacity; this is shown at the end of the power house in Fig. 1. The coal is taken by a tip car running longitudinally under the coal pocket and is weighed, in the car, on platform scales and delivered on the boiler room floor, in front of the boiler. This is slightly below the level of the basement floor of the engine room, the hight required for the boilers and flue being about that required for clearance in the engine room.

The Old Bed power station is shown in Fig. 3. This contains three Babcock & Wilcox boilers, two of them 6 wide and 9 high, with 36 in.x18 ft. drums; and one 12 wide x 9 high with a 36 in. x 23 ft drum. They carry 110 lb. pressure. A Knowles duplex pump 6x4x6 in. with outside packed plungers, and a single Warren pump 6x4½x12 in. supply feed water. A Reynolds corliss tandem compound engine 12 & 24 x 36 in., giving 200 h.p. is belted to a 6 pole Crocker-Wheeler 150-kw. direct-current generator, giving 230 volts at 550 r.p.m. This supplies power for No. 1 mill of the separating plant. The electric light reserve supply at 125 volts is from a 30-kw., G. E. generator, class 4-30-1,000, direct connected to a Southwark engine, 10x16 in.; also in use for electric lighting is a G. E. motor generator set consisting of a G. E. induction motor of form K, class 2-50-1500, operating on 440 volt, 25 cycle current and driving a direct-current generator, class 4-35-1500 giving 115 volts at no load, and 125 volts at full load. This supplies the regular incandescent mine circuits and the G. E. form 5, enclosed arc lamps. This is arranged to parallel with the reserve set mentioned.

A two-stage Ingersoll-Sergeant compressor, class JC, 25¼ & 16¼x16 in. with a capacity of 1200 cu. ft. of free air per. min. at 71 lb, receiver pressure; belted to a G. E. induction motor, from KS, class 6-200-500, operating on the 440 volt circuit, and a steam driven Rand compressor are installed in this building. The latter is two-stage and has compound cylinders; it is a made over machine, the high pressure side having been added, by the company's engineers, to the original machine; the latter now constitutes the low pressure side. Its capacity is 1250 cu.ft. per min. at 71 lb. receiver pressure.

The hoisting machinery at this station is steam actuated, with control from the engine room floor. Two Webster, Camp & Lane double Corliss reversing engines, 16x36 in., with cranks set quartering, drive (each) double 8 ft. drums with a winding capacity of 1200 ft. The clutches are air actuated, but hand and foot brakes are provided, as are also separate dial registers for each drum. These handle the ore of the Joker and Bonanza shafts.

A Buckley barometric condenser is used for the condensing engines in this station, the water levels are such that it is self maintaining as far as vacuum is concerned; no air pump is used. The circulating water is taken from the second pool; it is pumped against a head of 100 ft. by a double stroke Knowles pump giving about 200 gal. per min., and additional circulating water is taken from the gravity pipe line mentioned later. A Reynolds combined air-pump and jet condenser 12x14 in. is used in connection with the Reynolds tandem-compound engine; it is located, with the Knowles pump mentioned, in a pump house shown in the general view of the plant.

The three compressors, Nordberg, Ingersoll-Sergeant and Rand, deliver through their receivers into a common system of air mains which supply the power drills and sinking pumps in the

Joker and Bonanza shafts of the Old Bed Mine, and the A and B shafts of the Harmony Mine. The line is also carried, to supply reserve power for operation, to the machine shop.

At the "AB" sub-station a 300-h.p., G. E. induction motor, type K, class 12-250-300 is belted to a Nordberg two-stage compressor 20 & 30x40 in., giving 2550 cu.ft. of free air per min. at 71 lb. receiver pressure. Two 300-kw. G. E. transformers, air cooled, are installed with individual switchboard panels, fitted with Thomson ammeters and oil break switches. Overload relays are fitted on one panel. Thomson watt-meters for the compressor and hoist-motors are also provided. A four blade double throw switch, throwing from four to three or *vice versa* permits the operation of the compressor at either 250 or 500 r.p.m. without change in efficiency. This is done by changing the relation of field coils to give either 12 or 6 poles as the position of the switch may determine.

The transformer air blast is supplied at 1-oz. pressure by two 30-in. Buffalo Forge fans direct connected to 1-h.p. induction motors. A self measuring oil tank is used in this building, it is set for a quart, pint or half pint, and the crank turned; this operates upon a pump by means of a rack and delivers the specified measured amount. This type is used throughout the works. The building contains two double-drum winding-engines driven by a geared G. E. induction motor, form M, class 12-300-250, with form T rheostatic control. The 7 resistance cases are disposed in the drum pit, 4 on one side, on which hoisting is done under ordinary working conditions, the others are cut in when reducing speed to hoist men. The engines were made by Webster, Camp & Lane, and have drums 10 ft. in diameter, with a capacity of 1500 ft. of 1⅛-in. rope. The two engines (4 drums) are under pulpit control by two hoistmen; each drum can be operated singly or they may all be operated in any desired conbination. A "plug" tally board is used, this has ten holes per row, for ore hoisting and has two extra rows (20 holes) for men and tool trips. Each skip holds 1½ tons net. Dial registers are provided for each drum.

Outside of this building is a primary receiver, 30 in. diam. by 40 ft. long. The air line is 7 in. diam., and the secondary receiver is an old tubular boiler 60 in. x 16 ft. All of the power-houses are fitted with 36-in. Pancoast ventilators.

FIG. 1. CENTRAL POWER-STATION. EXTERIOR.

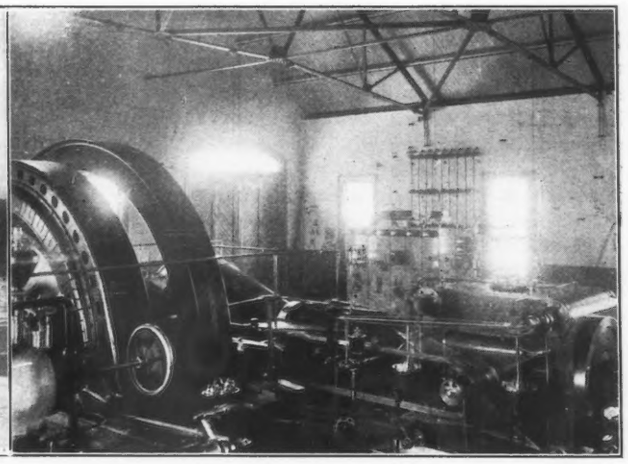


FIG. 2. CENTRAL POWER-STATION. INTERIOR.

The two water-power plants furnish about 700 h.p. and are situated respectively, at Kingdom and Wadham's Mills. The former is west of the Central power-house, ten miles away, and current is transmitted to Mineville over a 3-wire line of No. 1 bare copper with no transpositions. Locke insulators are used on standard 3¼x4¼ in. cross arms with 1-in. locust pins. At the Kingdom plant is installed a 375-kw., G. E. alternator, giving, at 375 r.p.m., 6600 volts at 25 cycles. This is direct connected to two Pelton wheels, 26 in. diam., operating under 290 ft. head. The penstock is 32 in. diam., and 6000 ft. long, made up of 3-16 in. riveted steel plates except the lower 1000 ft., which is of ¼ in. plate. The exciter is a 7½ kw., G. E. bi-polar machine. The penstock is fed from a dam which, in turn, is supplied by a storage reservoir ¼ mile above.

The Wadham's Mills plant contains a 300-kw., G. E. alternator, operating at 500 r.p.m., belted to a pair of 54-in. McCormick turbines. These run under 48 ft. head, and are supplied through a 54-in. penstock, 380 ft. long. The draft tube is 18 ft. in length, and the exciter is a 7½ kw., G. E. bi-polar generator. This plant is 9 miles from the Smith Mine, and feeds it through a transmission line of No. 4 bare copper, similar, in construction, to the other line. The 6600 volt transmission is reduced to 3300 at this point, and cut into the Mineville circuit through a No. 1 bare copper transmission line.

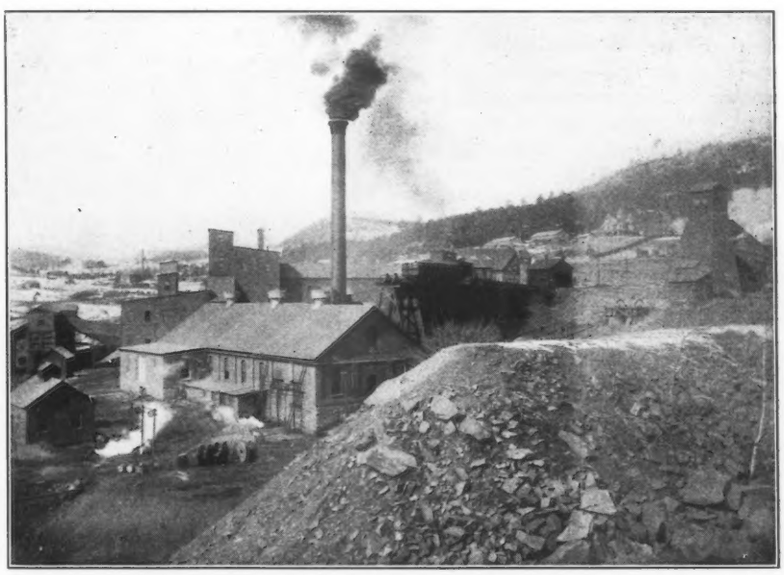


FIG. 3. OLD BED POWER-STATION AND COAL POCKET.

The two water-power plants are owned by Daniel F. Payne of Wadham's Mills, and, in operation, take care of a good

part of the Mineville load. The Central power-house is operated in synchronism with them, and takes care of the peaks. Private telephone lines, as well as the regular exchange system, connect the power-houses and the offices at Mineville and Port Henry.

The Smith Mine sub-station is fed from the Wadham's Mills plant through three 75-kw., type H, oil insulated, G. E. transformers. The switchboard by which the high tension current is manipulated is fitted with potential transformers, manually operated oil-break switches for 250 and 100 amperes, Thomson volt-meters, ammeters, and recording watt-meters. The voltage is stepped down to 3300 volts, and then, together with what current may be fed in from the Central power-house is stepped down through three 60-kw., form A, oil insulated, G. E. transformers to the regular 440-volt potential used in all the workings. A type HT. form E, 75-kw., oil insulated transformer, and one of type H, is installed for lighting. An oil switch for operating the electric pump in the mine is located in the transformer house; which is of concrete, adjoining the brick sub-station. The pump is an Aldrich triplex single action vertical pump, with a capacity (against a head of 1000 ft.) of 100 gal. per min. It is geared to a G. E. induction motor, form K, class 6-30-500, operating on the regular service lines, at 440 volts.

In the sub-station proper a G. E., induction motor, form K, class 6-75-500 is belted to an Ingersoll-Sergeant, class JC 2-stage compressor 18-¼ & 12-¼x12 in. This set is in duplicate, each unit having a capacity of 650 cu.ft. of free air per min., at a pressure of 60 lb. An auto-starter or compensator is installed to minimize the starting torque required in the operation of these machines. The lower side of the belt runs over an idler which is connected through a counter-shaft with individual single action vertical pumps for supplying cooling water to the compressor cylinders. This is mine-water taken from a concrete tank, under the transformer house. The receiver is a 60 in. x 16 ft. horizontal return tubular boiler.

The hoist is a double 8-ft. drum machine, with hand clutches and hand brakes, and with dial registers for each drum. It is geared to a G. E., induction motor, form K, class 8-100-375 operating through a form T controller on 440 volts. The entire installation is operated normally on current from Wadham's Mills, only the fluctuations in the load (as far as this sub-station is concerned) are taken care of by the Central power-house. Electric power costs approximately ½ c. per h.p.-hour.

The accessory equipment of the main workings includes a water-supply system and provision for fire protection. The water supply for the latter, as well as for boiler and other industrial purposes is from a gravity supply. The reservoir is at an elevation of about 100 ft. above the Old Bed power-house at a distance of ¾ mile. Overflow from this supply passes through the cooling pond previously mentioned, at the Central power-house and continues to the "second pool" near the Old Bed power-house; to this is added the flow from the Harmony and Old Bed workings. The water is unusually soft and the scale formed in the boilers in two years use is found not to exceed ⅛ in. thick.

Hose houses are provided throughout the works, these are fitted with hose on reels and racks and are connected with the water main from the gravity water system, as well as with feed pumps arranged to be used as fire pumps, and to an underwriter's pump 14x7¼x12 in. delivering 500 gal. per min.; a sufficient supply for two 1⅛-in. smooth nozzles, when operating at 140 strokes per min. In addition there is a 400-gal. Babcock chemical engine, and Babcock portable fire extinguishers and hand grenades are distributed through the buildings and at the homes of responsible employees, for use in case of local fires. Where the well facilities are suitable, hand pumps of the windmill type, with hose, have been distributed through the town.

[In the second article of this series (this JOURNAL, May 26, 1906, p. 988), the content of phosphorus in the Harmony ore is given as 12 per cent. This is a misprint; it should read 0.12 per cent. Ed.]

Mining in New Guinea.

Captain Barton, Acting Administrator of New Guinea, in his annual report to the Commonwealth of Australia, speaks on the gold-mining industries of New Guinea as follows: The Yodda gold field is extensive and rich in alluvial gold. It has not been exploited as energetically as might be expected for three reasons—(1) the expense of living; (2) the difficulty of approach; (3) the hostile attitude of the natives. These obstacles have now in a large measure been removed by Government action, and the miners are beginning to take advantage of the facilities afforded by the new road and the other improvements. So long, however, as food has to be carried on men's or horses' backs to the field the price of provisions will inevitably remain high. The main item of transport is rice for feeding the native laborers employed by the miners. An enterprising individual would assuredly make more money by growing and selling native tubers than by gold digging, and at the same time would solve half the difficulty. Such work, however, is not likely to be undertaken on a large scale by any one of the miners themselves; the speculative spirit is so rife in them that they can never be satisfied with a definite income.

Other advices state that the Kulumadua Gold Mining Company, on Woodlark Island, is paying occasional dividends, but though mining expenses are comparatively low, the output is limited by the crushing capacity, there being barely enough water to run one 6-ft. Huntingdon mill 16 hours per day. There are four 10,000-gal. wooden vats being erected, which should give some 10 days' additional water using returns. No. 4 level north is opening up well, there being 20 ft. of ore in the stopes in places. The average yield is 15 dwt., and the company crushes 400 to 600 tons a month, according to water available.

Busai is an old alluvial field, where the ground sluicing has won large quantities of gold, of which no record has been kept. The alluvial is recent, occurring in wash, and boulder clays. A large percentage occurs as gold in quartz, which has been shed from leaders known as "specimen gold." Several reefs have been opened up within the last few months, some being very rich, many ounces of gold occurring in vugs in chalcedonic quartz, traversing a laterite after an intermediate igneous rock, probably a syenite. The field is a net work of reefs, very rich, but not very large, 2 ft. being large, and the average 9 in. There have been no crushings yet, as no mill is available, and transport is heavy.

At the Kerravacoom field, which has only lately been tried for mining, two adjoining claims have had a crushing. The reef resembles the Kulumadua reef more closely than any other. The reef worked ranges from 2 ft. to 4 ft., but the formation and quartz show about 14 ft. on the surface. These claims have been sunk to water level, about 50 ft.; one is driving 20 ft. to 30 ft. at that level. A pumping plant, winding gear, and crushing appliances will have to be installed before much good can be done. The ore is at present sacked and sent to Aldershot and Charters Towers, Queensland.

Other small fields are being worked for alluvial, but are not at present worth any further mention.

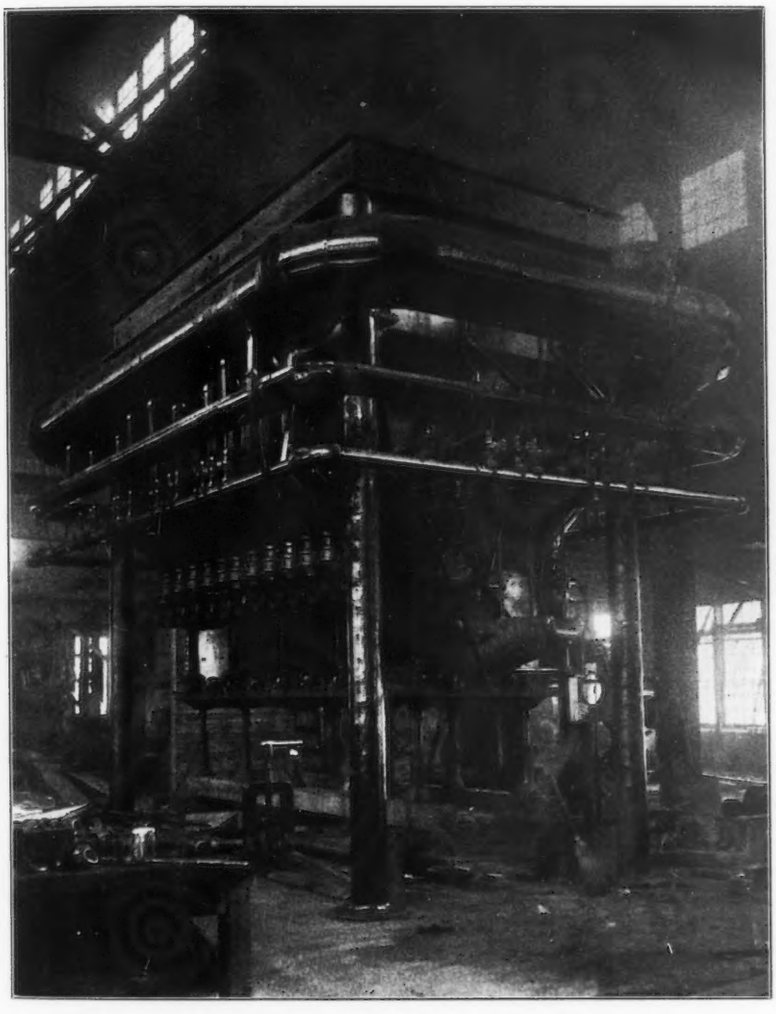
The Yukon Mining bill now before the Dominion Parliament, which is being discussed in committee, fixes the size of a mining claim on a creek at not exceeding 500 ft. in length extending back 1000 ft. on each side of the creek. Placer claims elsewhere than on a creek shall be 500 by 1000 ft. The bill is in accordance with the draft of a mining code prepared by the Yukon Council, after the matter had been thoroughly discussed by the miners.

Finance Minister Fielding, in his annual financial speech in the Canadian Parliament May 22, announced that the exemption from duty of machinery for use in alluvial gold mining which expires June 30 would be continued for six months longer.

New Blast Furnace for the Matehuala Smelter.

The National Metallurgical Company's smelter at Matehuala, Mexico, which was put into successful operation last year, is now being increased in capacity. The additional furnace and equipment is being furnished by the Traylor Engineering Company, of New York, which designed the original plant. It was built at the new works at Allentown, Penn., and was shipped to Mexico early in May. The illustration shows the furnace as set up in the shop. The furnace is 42 in. wide and 160 in. long, inside the tuyeres. It has a capacity of 250-300 tons per day. The furnace is fitted with the Giroux hot-blast top, similar to those used at the United Verde smelter at Jerome, Ariz., where the top was introduced while Mr. Giroux was superintendent of that plant. This device consists of two sets of air-heating pipes, surrounding the upper part of the furnace within the brickwork, connected directly with the bustle pipe by means of a nipple at each end of the furnace. The upturned opening in the bustle pipe, shown in the illustration, forms this connection on the end of the furnace shown in the foreground. There is a similar connection at the other end. The hot-blast top is expected to heat the air for the blast to a temperature of about 400 deg. F. and to effect a saving of 30 per cent. in coke, besides adding materially to the daily capacity of the furnace.

The furnace is constructed with flange-steel water jackets, made so that no rivet heads or riveted seams are exposed on the inside of the furnace. The water pipe and bustle pipe are both on the outside of the blow pipes and about 4 ft. from the jackets, so that in case it is desired to remove a jacket section the water pipes and blast pipes immediately in front of it may be taken off and the jacket removed without disturbing the balance of the air and water connections on the furnace. This cannot be done where the pipe is arranged on the inside of the blast pipes, as is usually the case. The upper jackets are supported on an I-beam frame carried by brackets on each of the four corner columns, independently of the other portions of the furnace. All the jackets composing the lower set are fitted with lugs, arranged to bolt to similar lugs on the bottom flange of the top jackets; in case the furnace bottom plate is removed to replace the brick lining, or for any other reason, the set of lower jackets remains in place without disturbing any of the connections. The lower jackets are made so that any sediment which may collect in them is deposited at the bottom of the jackets, below the zone of intense heat, and therefore will not endanger the jacket sheets.



BLAST FURNACE FOR MATAHUALA SMELTER.

The joints between the blast pipes, tuyeres and jackets are arranged with recesses and provided with asbestos packing held by clamp draw-bolts. This affords tight joints and at the same time allows sufficient flexibility to avoid straining the joints and leaking when the furnace expands or contracts from the heat. No brickwork is required for lining the furnace below the feed floor, except the small amount immediately over the furnace bottom plate. The furnace is tied at the sides with an I-beam frame having end draw-bolts. The waste-water discharge from the gutter passes down through two outlet pipes into the central opening of the two rear columns. These are furnished with a tap flange at their base, which, when the furnace is erected, is below the ground floor and may be there connected to a drain.

Mining in Honduras.

Consul Felix S. S. Johnson writes from Puerto Cortes to advise Americans not to invest in mines in Honduras until the Government makes roads so that machinery can be easily transported to the mines. He says: Thus far the mining ventures of American companies in this district have been failures, large sums of money having been invested with little or no returns. Machinery costing thousands of dollars, owing to poor roads or no roads at all, has never reached its destination and can to-day be seen on some trail or bank of stream, a mass of ruins and rust. Gold is found in Honduras, but as the country has no roads it is poor policy to think of investing in mining enterprises. I know of only one or two mines in the interior managed and owned by American companies which are doing well. These companies have built their own roads to the Pacific coast and employ automobiles in carrying goods from and to their mines.

In eastern petroleum pipe-line producing territory the runs from wells during April amounted to 3,007,104.09 bbl., over 650,000 less than in April, 1905, while for the four-month period similar receipts aggregated 12,014,047.72 and 14,777,773.10 bbl., respectively. Regular deliveries in 1906 amounted to 3,925,817.17 bbl. for the month and 15,659,193.14 for the four months, while during the preceding year they were 4,131,645.08 for April and 15,929,858.43 for the year to April 30.

Arizona and Sonora.—III.

BY DWIGHT E. WOODBRIDGE.

The Copper Queen Consolidated Mining Company.

The Copper Queen Consolidated Mining Company, as has been stated, is one of the world's large producers of copper. Its output of copper for 1906 will amount to about 100,000,000 lbs. Affiliated with it by equivalent stock ownership are other concerns in southern Arizona and northern Sonora, whose annual product is about 69,000,000 lb. Through the ownership of all these companies by the well known firm of Phelps, Dodge & Co., and their other metal-selling interests, this firm is one of the chief factors in the marketing of the world's copper product. Not only are these concerns important in the business with which they are connected, but by their sustained honesty of purpose, their broad and liberal management, their conservatism and their reliability, they are an object lesson in the business world to which they belong. No breath of scandal, no whisper of manipulation, no taint of dishonorable method, has ever been connected with these companies. Their mines are vast in extent, and still greater in future possibility; some of them are of high copper tenor; while those of lower grade are worked so intelligently and on such a magnitude, their investments in metallurgical plants, in coal and coke, in railways, in merchandizing, and in other subordinate and corrolated enterprises, are so broad, so ample and so well considered, that they are ably fortified in every direction.

The Copper Queen Consolidated was organized in 1884 (as the result of the combination of several claims at Bisbee), and has been in continuous operation ever since. Up to May 1, 1906, its production has been 296,500 tons of copper. Its capital stock is in 2,000,000 shares of $1 each. As the company has not more than a dozen shareholders (and these more or less closely associated by personal ties), little is known of its dividends or profits; but these are evidently satisfactory. The president of the company is Dr. James Douglas; its secretary and treasurer is George Notman, of New York. The local management consists of Walter Douglas, general manager; S. W. French, assistant manager; George B. Lee, smelter superintendent; and W. S. Clawson, mine superintendent. The head office of the company is located at Douglas, Ariz., about 26 miles from the mines.

In addition to the mines and smelter, there are associated in joint ownership about 1000 miles of railway, reaching from the Dawson coal-fields of northern New Mexico, to the city of Benson in south-central Arizona and with numerous branches. It is supposed that the company has under consideration the construction of a line to the Pacific coast; and it is quite certain that it will cover a short hiatus in its New Mexican line by the purchase of the Rock Island line from Santa Rosa to Tucumcari, or by construction in the same general district, thereby closing a gap over which it must transport all its coal and coke. There has been talk (and there is, perhaps, still a possibility) of the construction of a line from the coal districts near Durango, Colo., toward its smelting city of Douglas. One of its branch lines runs from Hermanos to Deming, New Mex., where it connects with the Santa Fe and the main line of the Southern Pacific. At Hachita it touches the Arizona and New Mexico, reaching the mines of Morenci and Metcalf. From this last named road the associated Detroit Copper Company has a line (the Morenci & Southern) reaching from its mines and works to the main line of the Arizona & New Mexico. From Douglas it has the Nacozari Railway, reaching its Pilares de Nacozari mines at Nacozari, in Sonora; at Fairbank it connects with the mines of Tombstone; and at its western terminus of Benson, and again at El Paso it connects with the main lines of the Southern Pacific.

In the Dawson coal fields this company is developing mines, and is making 400 tons of coke daily; it is increasing its oven capacity to about 1000 tons; it may build by-product ovens at Douglas; and it expects to supply coal and coke to its own road and to nearly all the smelters of the southwest. Its tracks begin at the coal-fields and end at the mines and smelters.

The mercantile departments of the various branches of Phelps, Dodge & Company operate large stores, wholesale and retail; as at Bisbee, Douglass, Morenci, Nacozari and Naco. Single stores in this group are supposed to do a business running to several million dollars per year. None of these establishments has the slightest resemblance to the company-store, as it is known east and south. They are separate from the mines, and have none of the unfavorable features of such stores in the coal regions. There is no obligation to buy from them, while the stores permit improvident Mexicans to cash in their time ahead of pay days.

The Copper Queen Consolidated Mining Company is producing from five shafts; the Czar, Holbrook, Spray, Gardner, and Lowell. It has two others, the Cuprite and Sacramento, on claims of those names; these are in course of development. The Holbrook shaft is at present the main producing avenue for the company; it is six-compartment, and 500 ft. deep. The Lowell is 1200 ft., of which the lower 150 ft. is through high-grade ore. The Sacramento is 1000 ft. deep in rock.

If possible all these shafts will be connected by permanent drifts through rock; but it has been found a difficult matter to make such connections. Several of the older and upper shafts are creeping badly, especially the Holbrook, which frequently gives trouble. It is not expected that the Cuprite shaft will ever be much of a producer; it has been driven as an air-connection for the benefit of miners working toward ore bodies that are looked for in that part of the company's ground, near the line of the Shattuck-Arizona mine. The distribution of power is now quite expensive, for there are many isolated plants; but the company expects to instal a central station for the generation of electricity, which will be used for most mine purposes, including hoisting, tramming, drills and pumping.

Development underground is extensive, and covers more than 100 miles of levels. Driving is now being pushed at the rate of from 500 to 4000 ft. per month. The number of men employed at the mines, on surface and underground, is about 2600; the daily hoist is from 1900 to 2000 tons. The daily product in the stopes per man per shift is about three tons, miners doing their own timbering. The discrepancy in these figures is caused, in part by the amount of development work done, and in part by the nature of the ground. More men are actually employed in repair work than in mining, for the ground is difficult to handle and maintain. More than 450 men are on dead work, aside from shaft repairs; these latter are heavy. The development of new openings is now proceeding faster than at any time in the company's history.

The mine is operated by the customary western method of square-set timbering, the gob being filled back as solid as practicable. The method seems necessary where the ore-bodies are of the irregular character of the Bisbee replacements (where the price of copper has much to do with the extent of the ore-deposits). But there are many places through the west where the square-set-and-filling system is still in honored use, in which a little study of more modern methods (as practised in districts that have fought out the question of cheap mining, impelled thereto by necessity) would quickly show where vast sums might be saved. The mine opens 70 to 75 stopes at a time, so "jigger bosses" (subordinate to the shift bosses) are employed in the stopes, each one over a few miners; it is impossible for shift bosses to cover thoroughly the ground required to be opened. All stopes are now kept as small as possible—an advance from the method of a few years ago when large openings were permitted. Sets are 5 x 5 x 7 ft.; or 175 sq. ft. per set. The cost of timbering is high, though it is being reduced somewhat. For the last three quarters of 1905, timber used was 25.2 ft., b.m., per ton of ore.

while the average for the past year or two has been about 27 ft.; this includes a little surface construction. The cost of timber (all of which is square and comes from the north Pacific coast) is now about $25 per 1000 ft. b.m.

As elsewhere in the southwest, old stopes have been mined out several times; this is the result of the progress of metallurgical development and cheaper freights, which have made into ore what had formerly been waste and had been used to fill mined-out workings. In this mine many old gobs, now being mined out, are found to average 7 or 8 per cent. copper, which is as high as the present average mine product. Ore is now being mined from hitherto untouched ore-bodies, that are located above or below old workings or that are surrounded by them. The deposits are of such size that single stopes have been mined for from 15 to 18 years and are still making product.

As showing the method of ore occurrence, it is interesting to note that ore-stringers (running from the thickness of a knife-blade to several inches) have frequently been followed for hundreds of feet into important ore deposits; some of the largest and richest bodies of the camp have been found in this way. These stringers form, of course, along faults and slips, and where the mineralized solutions have been able to penetrate most readily.

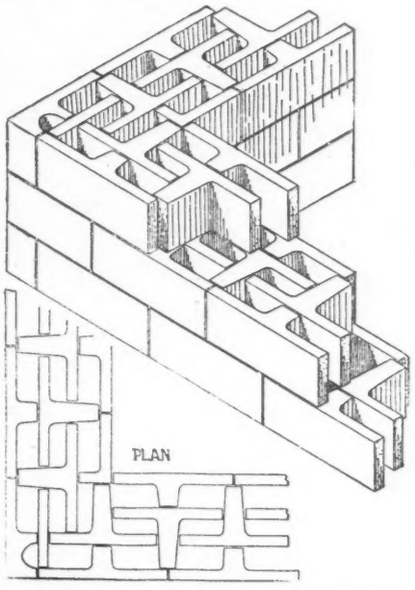
The limestone is broken by caves, some of which are 300 by 700 ft. in their chief dimensions, their shapes being, to be sure, exceedingly irregular. Many of these are lined with ore, others with stalactites; and still others with the rich velvety green of malachite, or the blue of azurite.

When first broken into they are most gorgeous in coloring and design. At a session of the American Institute of Mining Engineers, held at Bisbee some years ago, a banquet was spread for the members in a cave sparkling with calcite crystals; it was reached from the Holbrook shaft.

Contacts between the schist or porphyry and the ore-bearing limestone, have not been extensively explored; and it is possible that ore may be found to extend some distance into both the older and the eruptive rocks. It would seem quite plausible that the latter, at all events, might be found of value; pyrite certainly occurs on both sides the contact. These contacts are irregular, with great departures from simple surfaces; they pitch in every direction and are much broken in outline There has been great metamophorism and mineralization in both directions; the character of the porphyry would not seem to indicate that it should be a bar to solutions—at least, to the later ones. On the far side of Sacramento hill, away from all mine workings, an old dump of the Copper King mine, long since abandoned, shows abundant evidence that the pyrite of the original mineralization extended through this great intrusive stock.

The zone of oxidation is irregular. Unaltered sulphides are found within 50 ft. of surface; and oxide ores 1200 ft. down, in other parts of the camp; due to recent irregular fissuring, and an uneven percolation of the oxidizing waters, there are occasional large masses of lean pyrite completely enveloped in rich ores, in which chalcocite is quite prominent. This indicates irregular movement of the circulating waters.

It is the policy of the Copper Queen Company to make separate tasks of as many classes of work as possible. These are made into contracts, and the contractors are paid frequently—often at the close of each day's work. These contractors are mostly Mexicans, especially around the smelting works. The average white wage, at the mine and in the camp, is $3.50 per day; the lowest pay for Mexicans is $1.50. The bulk of labor is on the 8-hour basis. Including both mine and smelters, the company makes about 8,750,000 lb. of copper monthly; it employs 4000 men, with an average of 2200 lb. of metal per man per month.



METHOD OF LAYING CONCRETE BLOCKS.

Demand for Silver in India.

The heavy demand for silver in India and in the Orient generally is having, with other influences, a marked effect on its price, which rose to 67⅝c. in London in the third week of May. There has been an advance in the price of silver of 20c. in three years. This advance is expected to continue, and it will have a good effect on the trade in eastern markets by increasing the purchasing power of the money now used in the Orient. In the first four months of the current year Great Britain exported to India $30,000,000 worth of silver.

A Power House of Concrete Blocks.

The power house at Lockport, 28 miles from Chicago, where the 34-ft. fall of water from the Chicago drainage canal to the Des Plaines valley is to be utilized for generation of power for transmission to Chicago, is to be constructed of two-piece concrete blocks. We believe that it is the first large power house to be constructed in this way. The walls are to be 37 in. thick at the base and at pilasters, and 28 in. thick at the top and between pilasters. The method of laying the blocks is clearly shown in the accompanying engraving. The blocks are machine-molded. The roof of the building is to be of steel trusses, with plank sheathing, covered with asphaltum felt and red tile.

Utilization of Atmospheric Nitrogen.

According to O. N. Witt (*Chem. Ind.*, 1905, XXVIII, pp. 699-707) Frank's method appears to have met with a certain amount of success, but it depends upon the cheap production of electrical power and also of pure nitrogen. At the present time the most promising process appears to be that of Birkeland and Eyde, which is in operation at Notodden, Norway. The nitrogen compounds are absorbed in towers, and the weak acid is used over and over again in the towers until it attains a strength of 50 per cent. The gases, leaving the absorbing towers, are next passed through milk of lime and then over dry lime, calcium nitrite being chiefly produced. This is treated with nitric acid, and the nitrous acid evolved is oxidized, the nitric acid formed being absorbed in the absorbing-towers. At present, the whole of the nitric acid is fixed as calcium nitrate. In accordance with a suggestion by R. Messel, the normal calcium nitrate is converted by addition of quicklime or calcium sulphate, into basic nitrate, which forms a practically non-hygroscopic powder of great value as a fertilizer. The final product may, however, be obtained as nitric acid, or other nitrates, or nitrites. The daily production now amounts to 1500 kg. of anhydrous nitric acid, and an output of 500—600 kg. of nitric acid per kilowatt-year can be regularly maintained. The production will be greatly increased as more water-power is brought under control. The total amount of water-power available for the production of electrical energy is estimated at over 350,000 h.p., and it is stated that it will be possible to generate electrical power at the low price of 12 marks per horse-power year.

The Roumanian Ministry of Public Property reports the production of crude petroleum during the first half of 1904 as 223,362 tons, and in the second 277,199; during the first half of 1905 it was 276,865 and in the second 338,025.

The Savelsberg Process.

The metallurgy of this process, and its results, were described in an article published in the JOURNAL, December, 1905. It will be remembered therefrom, that this is one of the "lime roasting" processes, analogous in principle and practice to the Huntington-Heberlein process, but with the important difference that whereas in the former the galena ore is partially roasted before being charged into the converter for final desulphurizing, in the Savelsberg process, the raw ore, mixed with a suitable proportion of limestone

FIG. 1.

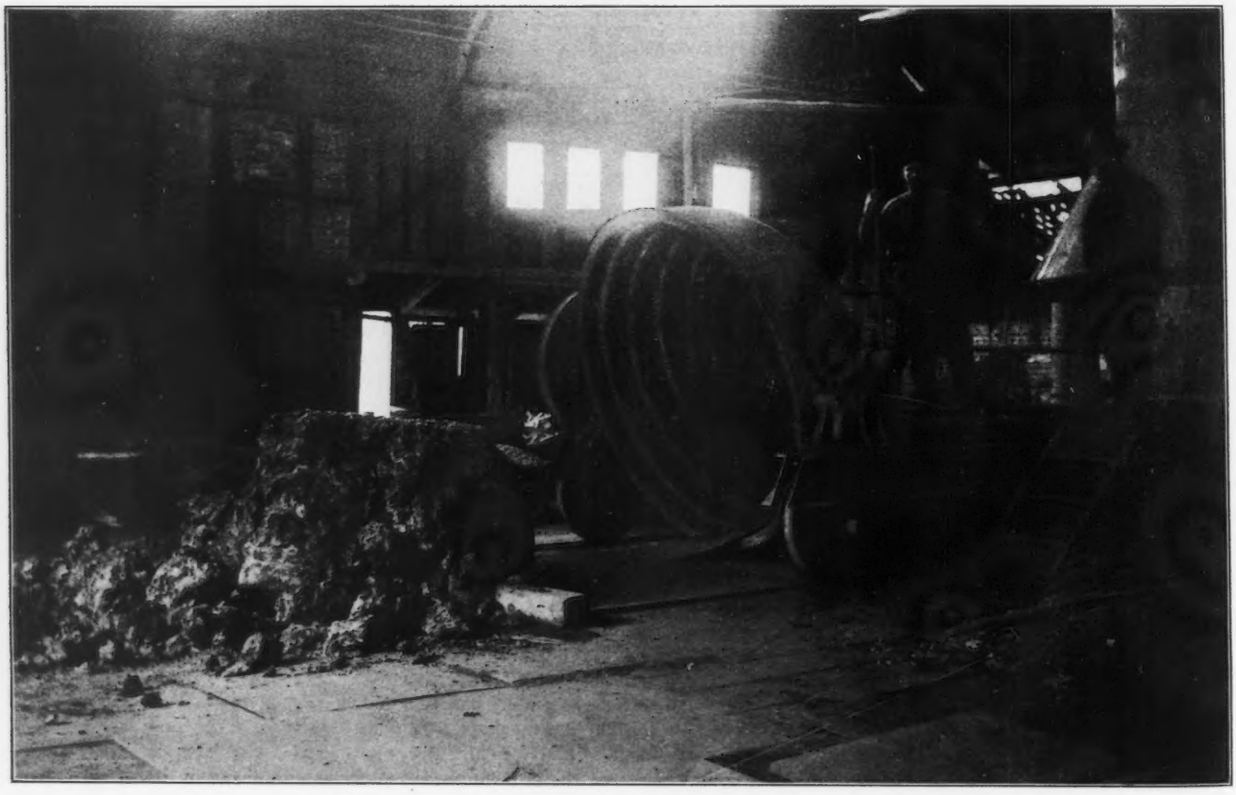


FIG. 2.

and silicious flux is blown directly in the converter. The final result is about the same, but in the Savelsberg process the preliminary roasting and considerable handling of material is saved. The Savelsberg converter is similar in shape and dimensions to the Huntington-Heberlein, but it is supported upon a movable truck, whereas the Huntington-Heberlein converter is stationary in position, except for its ability to revolve on the trunnions.

FIG. 3.

The accompanying engravings, reproduced from photographs recently received from Mr. Savelsberg, show the arrangement of the converter in the lead smelting plant at Ramsbeck, Westphalia, this being one of the smelting works of the Stolberg-Westphalia Company. These photographs show very clearly the three stages in the operation of the process. Fig. 1 shows the converter, containing a desulphurized charge, turned on its trunnions to drop out the semi-fused mass. In Fig. 2, the converter has been tipped a little further, and the charge has been dropped out on the floor of the house. This photograph shows very well the extent to which the charge is broken by the fall, and the size of the main piece, which must be further reduced by driving in wedges, and sledging the fragments. Fig. 3 shows the converter in position for the blowing of another charge, the hood, connecting with the smoke pipe, having been dropped down upon the pot.

The *Moniteur du Pétrole Roumain* states that preliminary figures show that the production of petroleum in Baku amounted to 6,658,254 tons in 1905, as compared with 9,828,086 tons in 1904.

Tin Mining in Bolivia.

According to a correspondent of the *London Mining Journal,* the export duty on tin has been slightly raised on a sliding scale system, according to the price of bar tin (Straits) in Europe, a standard of which is quoted by the Government once every fortnight. It ranges from 90 cents (say, 1s. 6d.) per quintal (100 lb.) of barrilla, when tin is at or below £100, to $3.50 (say 5s. 10d.), when the price may be £200 per ton. For bar tin the corresponding exportation prices are $1.50 (2s. 6d.), and $4.20 (7s.).

Chilian syndicates are taking a good deal of interest in Bolivian mines, chiefly tin, and have obtained options on several properties. As an example of the conditions under which the mines are operated, the following is quoted from a report on the Llallagua property:

It is composed of three mines, viz., La Blanca, San José, and Quinsachata, in the province of Charcas, 52 km. from the Machacamarca station of the Antofagasta railway. From that station there is only a mule track; but there is a cart road of 18 leagues from Challapata to Uncia, which is 1½ leagues from Llallagua. A branch railway line is projected from Machacamarca to Llallagua, at a cost of $1,000,000 (Bolivian). The cost of transport from the mines to the floors is 50c. (10d.) per 100 lb. A wire ropeway has been ordered, at a cost of $120,000 (Bolivian). Production is at present limited; even so, about 150 tons of black tin of 68 per cent. Sn are produced monthly. A quintal (100 lb.) of such barilla is worth $40 (Bolivian). Total cost put on European market, $20. Present annual profit, $700,000.

La Blanca lode has been opened up to a depth of 230 m. (755 ft.), with adits from 400 m. (1,313 ft.) to 640 m. (2,100 ft.) long. The ore streak is calculated at 40 cm. (15¾ in.) to 60 cm. (2 ft.) wide, and of 19.6 per cent. tin. No sulphide ore has been met with. The San José lode is almost virgin. Two adits of 225 m. (738 ft.) and 400 m. (1,313 ft.), with 50 m. (164 ft.) backs, have been driven, showing a lode width of 80 cm. (2 ft. 7 in.) to 1.1 m. (3 ft. 7 in.), with a mineral streak of 70 cm. (2 ft. 4 in.) to 90 cm. (3 ft.). The Quinsuchata mine is new. Old workings there show the lode is 60 cm. (2 ft.) wide. Two old dumps there contain 7 per cent. tin. There is also some alluvial ground which gives 20 tons of stream tin monthly. It is calculated that the mines have 76,000 tons of ore in sight and 19.6 per cent. tin contents, which with a 25 per cent. loss in concentration would give 362,500 quintals of 68 per cent. black tin.

The world's annual production of iron slag is estimated by O. Boudouard at 100,000,000 tons.

Accuracy vs. Enthusiasm and Prejudice in Mine Reports.

BY PERCY WILLIAMS.*

In making the reports for intending investors by engineers (especially the younger and less-experienced) too much stress cannot be put upon the absolute necessity of an elimination from such reports of every vestige of enthusiasm or prejudice, except such as may be justified by the facts. One of the most difficult obstacles to be overcome is to make the examination unbiased by what one may have heard regarding that particular mine or district.

Excessive enthusiasm and prejudice are the deadly foes of accuracy in this as well as in every other line of research. There are few men in any profession who cannot be influenced to a more or less degree by the views of other men. However, the examining engineer can successfully combat this extraneous influence, first, by bearing in mind that he has been employed to give his own opinion, and, secondly, by rejecting all information except that which he can actually confirm by his own honest observation above and below ground.

Enthusiasm is generally the most subtle and difficult force to counteract where accuracy is desired. The vendors of the mine and the citizens of the mining district, from the stage-driver to the proprietor of the camp store, are all directly and indirectly interested in the sale and can be trusted to "put in a good word" at each and every opportunity. "Knockers" are a scarce article in a mining camp. There is the "old timer" to be guarded against—to flee from if possible. He has all the good points of every mine and prospect in the camp at his finger ends and none of the bad ones. He knows the precise location of every "bunch of ore" overlooked by former owners in every abandoned, water-logged mine for miles around. The chances are ten to one that this "old timer" was foreman, or shift boss, years ago on the very mine you are going to examine, and, for a stated sum he will show you heretofore unknown ore chutes that he had dreamed of for 20 years past.

Another element of influence to be carefully weighed is the proximity of profitable mines to the one you are examining. This factor merits the greatest consideration, but nevertheless don't forget you are not being paid for reporting upon these other neighboring properties. The neighboring ore shoots and veins may pitch or extend into your property at depth; but don't say you believe they do unless you can give sound evidence or theory to support the supposition. The safest "theory" to proceed upon regarding the existence of undiscovered ore shoots is generally the "diamond drill."

Another source of undesirable influence may be traced to the unstable enthusiasm of the intending investors themselves, who have employed you to make the report. The probabilities are that their expectations have been raised to an extreme degree by the "promoter." You are made to share in this brilliant expectancy and when your work upon the ground proves the fallacy of such expectations you are immediately assailed with a friendly and magnanimous desire not to disappoint the men who have paid you so liberally for making the report. Fight the sensation and remember that your employers make mining investments for the sole purpose of making money; and when you, as an engineer, save them from a bad investment you are also making money for them with great rapidity.

In opposition to enthusiasm, prejudice works to the other extreme, and the examining engineer should try to forget all the ill-favored, condemnatory things he ever heard about a mine or a district until these are recalled to mind and confirmed or confuted in the course of his actual examination. The district where you are going to conduct your examination may have a notorious "black eye." (Note here that a "black eye" is as difficult to disregard and quite as deadly in its way as the "old timer.") Large sums of money may have been fruitlessly expended in the district where is located the mine upon which you have been engaged to report; yet these failures may have been entirely due to faults of management, errors of engineers or to quarrels among stockholders and directors, and not to any lack of merit upon the part of the mines.

The geological formations and topographical, physical or industrial conditions in one district may have been proved to be detrimental to profitable deep mining; but the existence of these same formations and conditions in another region or district does not necessarily imply that deep mining in that section also would prove unprofitable. There might be slight, almost unnoticeable circumstances and changes in local conditions that would make all the difference in the world between the two districts as far as ore deposition is concerned. It is part of the engineer's duties to note and consider these changing conditions, and not permit the failure in one section alone to damn the future of another apparently similar section of the country.

It is my conviction from observation and personal experience that a large number of mining failures may be directly traceable to a too powerful injection of inaccurate optimism in the original reports, and, to-day because of an overdose of pessimism and prejudice that further and more careful diagnosis would prove to be totally uncalled for.

It is neither my desire or intention, in making these few observations, to create the impression that I believe it desirable to ignore entirely all outside influences, especially those which may be exerted by the proximity of profitable mines, similarity of geological characteristics, local history and former reports. On the contrary, my recommendation would be to absorb and consider all these diverse reports and legends bearing upon the district or mines under investigation, rejecting all such as cannot be confirmed by personal examination and study. Moreover, when the engineer in the course of his examination, in order to complete his report, is obliged to resort to any outside source for information or detail, attention should be called to these outside references in the report; giving in each instance authorities for such data.

It has been pointed out frequently by writers in the JOURNAL that one of the most common, as well as most dangerous, factors which serve to detract from the accuracy of a mine report is the tendency toward an over-estimation of the quantity of ore reserves not yet developed in a mine. There are few orebodies sufficiently regular and homogeneous to justify any extended safe speculation as to their invisible dimensions and average contents of metal at depths greater than attained by present workings at the mine.

It must be admitted that in nearly every mine-examination (tonnage and value of ore "in sight" having first been determined) there are varying degrees of latitude that the engineer is permitted to traverse in his efforts to estimate correctly the future quantity and quality of the undeveloped ore supply of the mine. This work of estimating future ore reserves—a forecasting of the life of the mine—marks the ranging of the engineer beyond the boundaries of the purely perfunctory business of measuring and sampling orebodies already "blocked out." It is the real expert work, calling for a combination of technical skill with a mass of practical detail garnered from many years of work in various fields under different physical, chemical, geological and industrial conditions. The responsibility attached to such attempts at prognostication are large—at times tremendous—and may well deter the man of inferior skill and training from engaging in that class of work. The ability to estimate with fair accuracy the duration and value of undeveloped orebodies in a mine under examination comes to the engineer slowly and by degrees, and is unconsciously being builded upon a foundation composed of his past training, experiences, successes and failures in

*General manager, Cleveland-Arizona Mining Company, Red Rock, Arizona.

a great many other mines and mining districts. It is the element of personality appertaining to the man as well as to the mine—an element quite incapable of accurate analysis, yet closely interwoven with success in all mining operations.

The mining engineer whose judgment is honestly and legitimately based on large technical and practical experience should, in forecasting future ore reserves, display no timidity either in commending or condemning the mine. He is paid for concentrating his talents upon and attempting a solution of the problems in hand; and he is indeed unworthy of his hire if he, from motives of extreme caution, refrains from recommending an expenditure of his client's money in a mine whose future, he, himself, absolutely believes in.

Picking Belts.

BY EDWIN H. MESSITER.*

In the treatment of metalliferous ores, sorting conveyors, also called picking belts, are used for a preliminary hand-sorting of the ore, as received from the mine, into waste and treatable ore, or into two or more classes which are to be treated separately. The ore is usually fed over a grizzly so as to fall on a slightly troughed belt conveyor in a wide layer of such depth that all of the lumps are visible, the purpose of the grizzly being to remove the material which is too small for hand-sorting.

The material which occurs in greatest quantity is allowed to remain on the belt until the delivery pulley is reached, whence it usually drops into a crusher or directly upon a belt conveyor. A second conveyor is frequently placed under the picking belt, parallel to it, and extended far enough back to receive the fine ore from the grizzly as well as the discharge from the picking belt. The width of belt is usually from 24 to 36 in., 32 and 36 in. being the most common widths. A speed of 35 ft. per min. is satisfactory in most cases, though where material is coarse and easily distinguished the speed may be materially increased, while for very close work it should be reduced. The capacity at a given speed will depend on the size of the ore. The smaller the ore is crushed, the thinner the layer on the belt must be in order that all of the lumps may be exposed to view. With 3-in. lumps a 36-in. picking conveyor running 35 ft. per min. will have a capacity of 35 tons per hour of ore weighing 100 lb. per cu.ft. Under the same conditions a 24-in. conveyor will have a capacity of about 20 tons per hour. For a given width of sorting belt, the capacity may be taken within reasonable limits as directly proportional to the speed and to the average size of lumps in the material carried; e.g., the above conveyor, if run at a speed of 42 ft. per min., instead of 35 ft. per min., would have a capacity of 42 tons per hour instead of 35 tons per hour. If run at the latter speed and fed with material of an average size of 6-in., the average thickness of the layer of ore can be doubled, so that the conveyor will then have a capacity of 84 tons per hour.

For troughed belt-conveyors of standard type the capacity will depend on the size of the conveyor and its speed. For moderate capacity the size of conveyor required is usually determined by the size of lumps rather than by the number of tons per hour to be carried. This is because the feeding chute must be wide enough to prevent choking, and the belt must be enough wider than the chute to receive the material properly without spilling. For example, if it were required to convey 25 tons per hour of ore containing 6-in. lumps it will be seen that, although a 12-in. conveyor is capable of carrying a much greater quantity per hour, it would be impossible to feed 6-in. lumps through a chute narrow enough to deposit the ore properly on the belt. It would be necessary to use a conveyor at least 20 in. wide regardless of the number of tons to be carried.

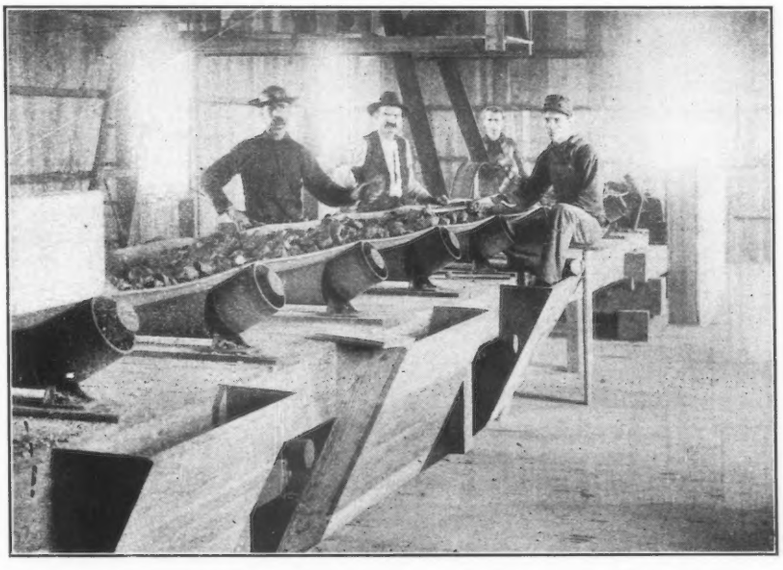
For ordinary run-of-mine ore the largest lumps of which do not contain over 1-cu.ft., a 30-in. conveyor, is suitable The sizes of lumps which may be carried by the several sizes of conveyors are as follows:

		Capacity for ore weighing 100 lb. per cu. ft at a speed of 400 ft. per min.
12 in. lumps	30 in. conveyor	560 tons per hour
8 " "	24 " "	360 " " "
6 " "	20 " "	250 " " "
4 " "	16 " "	160 " " "
3 " "	14 " "	120 " " "
2 " "	12 " "	80 " " "

Speeds up to 400 ft. per min. may be used under ordinary conditions and up to 700 ft. per min. in some special cases. It is desirable to limit the inclination to 20 deg. from the horizontal, though inclinations up to 26 deg. can be used with fine material and a steady feed under favorable conditions.

The life of belts of the same grade varies between wide limits, according to the annual tonnage carried and the length and arrangement of the conveyor. With conveying belts of correct design, made of proper materials, the life will be such that on the larger conveyors, the cost of belt renewals will approximate 0.1c. per ton of ore delivered to the belt. The cost per ton for belt renewals is greater on small conveyors than on large ones. The horsepower required will average about 0.00015 h.p. hour per ton per foot of horizontal distance carried, plus 0.001 h.p. hour per foot of hight elevated.

Automatic traveling trippers make it possible to supply a series of bins continuously without special attention. Fixed trippers which, like the traveling trippers, simply cause the upper belt to assume the form of the letter S, serve to effect the discharge at one or more fixed points other than at the end of the conveyor. Within the boundaries of a single plant, and sometimes beyond them, the cost of transportation of ore by belt conveyors of proper construction is reduced to such a low figure that the effect of distance and differences of elevation between the several parts is almost eliminated. With the aid of a plunger or shaking feeders in connection with belt conveyors, the movement of ore has become almost automatic in many works. The nature of the apparatus is such that there is no interruption of continuous working except for renewal of belts, and this is required only after long periods of use.



PICKING BELT OF TENNESSEE COPPER COMPANY, DUCKTOWN, TENN.

*Metallurgical engineer, Robins Conveying Belt Company, New York City.

The discovery of petroleum at Pitomaca in Croatia, Austria, is reported.

Milling in Southwest Wisconsin.

BY GEORGE S. BROOKS.*

The present methods of concentration in the zinc fields of the Upper Mississippi are in part an adoption of those prevalent in the Joplin district, and in part of the result of some five years' experience with the specific problems of the ores of this section. Serious attention to the design and construction of plants adapted to the proper handling of the particular class of wash dirt encountered at the various mines has been, however, often neglected. Since the first steam-driven mill was erected in 1901 near Hazel Green, about 50 concentration plants have been built; with the exception of a few modifications as to capacity, they follow largely the same general arrangement, regardless of the individual requirements resulting from the different ores to be handled. In a few cases, however, it has been made a point to become thoroughly familiar with the general character of the ore to be cleaned before the final sequence of treatment was determined.

With the Wisconsin ores, there appears to be considerable need of this preliminary study before the proper type of plant can be designed. The unquestionably great variety in the deposits is responsible for this condition, and it must be quite obvious to the engineer that no general type of mill will solve, with economy, the concentration question where so striking a difference in ores is met. The usual dirt hoisted for cleaning and separation has as constituents, blende, galena, marcasite and pyrite, and, as a gangue the dolomitic limestone of the Galena formation. The deposits themselves are most easily divided into three general classes: (1) The sheet formation of flats and pitches, (2) The disseminated deposits, and (3) the brecciated bodies. It can be easily appreciated that these three different classes must of necessity produce totally unlike kinds of ore. The ore may be rich slab sphalerite, a low grade 5 per cent. "stope dirt," or even the thinly scattered kernel jack of the muddy clay runs. The point is often made that, with the comparatively short life of these zinc mines, there is small justification in the installation of "high class" machinery. The general consensus of engineering opinion, influenced in no small degree by the actual results obtained in the past from the Joplin country, has proved this to be, in a large measure, true.

The blende itself shows considerable range in its general tenor, owing to the variation in iron percentage. This isomorphous iron of the ZnS often reaches 3 per cent. in what is locally known as "steel jack;" and, with this grade, the tendency to make "chatty" products seems to be the most pronounced. Often the galena occurs so intimately associated with the blende that with the simple three-jig plants it presents an obstacle to clean concentration, unless additional provision be made for regrinding and further treatment. With the shallow or upper run ores, usually just above the level of the ground water, there is often found considerable smithsonite, which cannot be separated from the blende by jigging. Often with this class of deposit, the smithsonite grades with a short range of depth to blende. These contiguous bodies are frequently of economic importance, and because of the intimate association of the two minerals, serious hindrance to the cleaning and separation of the ores results. In a few deposits barite is found, which is of great annoyance to the mill man, who is unable to eliminate this material from his concentrate. The FeS_2 is largely the splintery form of marcasite, and the mill concentrates range from 2 to 30 per cent. in Fe, depending upon the locality. In most instances, too, there is no little fluctuation with the change in depth of the workings, so that deposits which at the earlier stages show small evidence of needing magnetic separation, often develop, with the lower runs, such copious quantities of FeS_2 as to render them unmarketable with jigging alone.

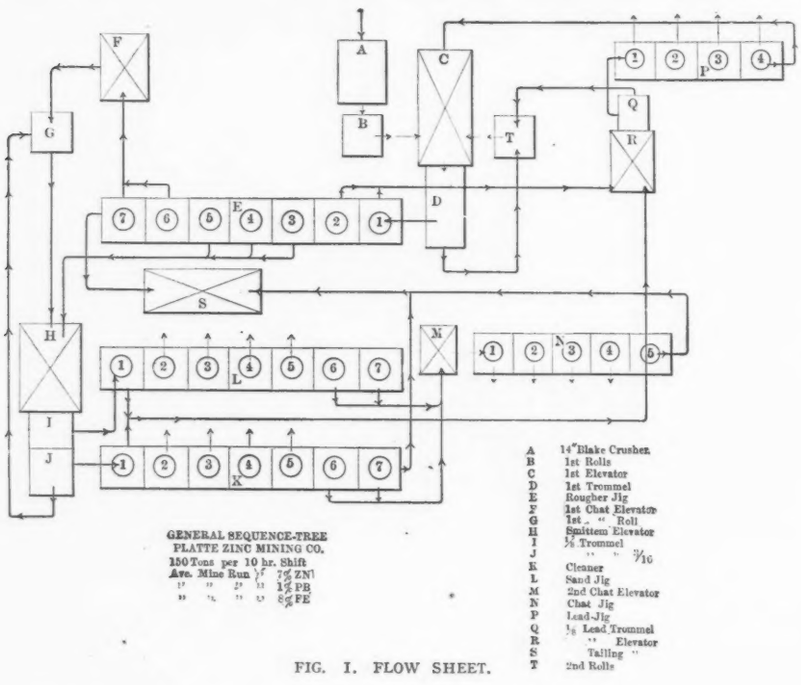


FIG. I. FLOW SHEET.

The comminution of the ore is best performed in from two to four stages, but it is somewhat common to find a far from docile ore of a chatty character being handled with only a crusher and a single pair of rolls. The finished concentrates are usually high in dolomitic gangue, as well as in galena. At the Platte mine, where there was considerable lead together with steel jack to be handled, a general system was employed by which the finished blende product was cleaned to 1.5 per cent. $CaCO_3$ and 0.5 per cent. Pb. Considering both the quantity of the lead and the chatty tendency of the jack, these results were considered satisfactory.

The sequence of treatment is shown in the accompanying diagram Fig. 1. The mine run is sent to *A*, where it is reduced to 1½ in. It is then passed through the first rolls *B*, is re-elevated and sent through the first trommel, (⅜ in. openings), the oversize going to the second rolls, and thence to the main elevator again.

The ⅜ in. product is fed upon the seven-compartment rougher jig *E*. The first two compartments of this jig make a lead product with approximately 15 per cent sphalerite, and this material is run to the lead elevator for subsequent treatment. Cells 3, 4 and 5 of *E* furnish middlings, which are flushed to the smittem elevator *H*, while the products of the sixth and seventh compartments of *E*, composed of grains of jack included in particles of dolomite, are elevated in *F* and re-crushed before joining the first middlings at *H*. It can be seen at a glance that the function of the rougher is here simply that of distribution.

The middlings are now sized with a tandem trommel *I* and *J*, the first, of ⅛ in. apertures, going to the sand jig *L*, while the second 3/16 in., is delivered to the cleaner jig *K*, the oversize being returned for re-grinding at *G*. There is enough "dust lead" drawn down to the first compartments of both *K* and *L* to make it necessary to send their hutch products to the lead elevator *R*.

* Mining Engineer, Platteville, Wis.

The second, third, fourth and fifth compartments of *L* and *K* give finished jack, the product of *L* obviously being from ⅛ in.down, while on *K* it is between 3/16 in. and ⅛ in. The last two compartments of these jigs are drawn to a very light bed and the material they handle is something like 10 per cent. Zn in the form of "flake" jack, which cannot be saved with the comparatively heavy and slow pulsation of either of these jigs. It is therefore fed upon *N*, a five compartment jig of smaller sieve area, operated with a very short stroke and high speed (325 r.p.m.) Finished jack is taken from the first four compartments. The tailings from these three jigs are sent from their settling tanks to *S*.

The chatty lead at *R* is sized down to ⅛ in. before being run upon the lead jig *P*. Finished galena is made on all four cells, while the tailings are run back to *C* because of their high zinc tenor. With this treatment the tailing losses are always satisfactorily low, and the sludge clean of lead and jack.

As a rule, the operators of few plants are aware of the actual character of the material being thrown away. This is largely due to the lack of accurate and disinterested sampling, or often the total neglect to do any assay work at all.

With the 50-ton plants, there is usually only one eight-compartment jig, with possibly two sets of rolls and from one to two trommels. With small mine outputs and docile ores, fair results can often be obtained. More often, however, there is no little difficulty, either in making a clean gangue separation or in handling the "chats" or lead. In one case, where the galena was often in large quantities, it was found feasible to use an Overstrom table, subsequent to a hydraulic classifier, in order to lower the lead percentage in the fine blende, and thus escape a heavy penalty from the buyers. As yet the economy of the table has not been clearly enough demonstrated to justify this additional expenditure in mill equipment.

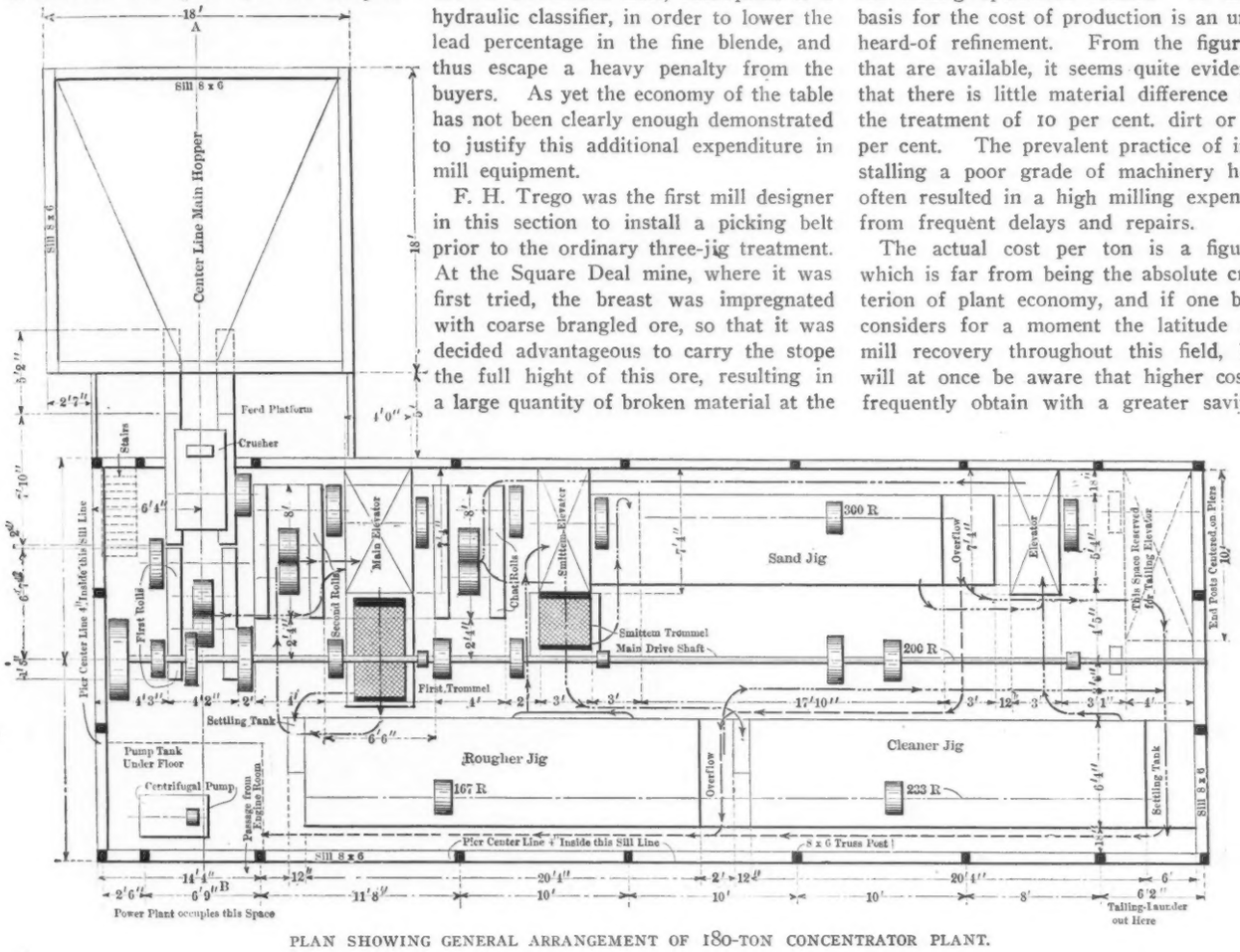
F. H. Trego was the first mill designer in this section to install a picking belt prior to the ordinary three-jig treatment. At the Square Deal mine, where it was first tried, the breast was impregnated with coarse brangled ore, so that it was decided advantageous to carry the stope the full hight of this ore, resulting in a large quantity of broken material at the face, which could not be effectively sorted underground. As a result the stope dirt was all hoisted to the hopper, run out over a coarse 1⅝ in. grizzly and the oversize run upon a picking belt, where the "deads" were easily discovered and picked out by one boy. In this way, the mill was saved from crushing about 20 tons of rock per shift, the capacity for ore being correspondingly increased. On even a 30 c. per ton basis of mill costs, the saving will at once become evident, as the picker's wages are only $1.50 per shift and the saving on the 20 tons is $6 in treatment charges, to say nothing of the extra wear and tear upon the machinery.

The efficiency of most of the mills will vary from 45 to 80 per cent., depending upon the design and operator. The average is in the neighborhood of 60 per cent. and this figure often represents remarkably good results, considering the facilities afforded the jigman.

Data upon milling costs is, on the whole, somewhat difficult to obtain, for with the exception of one or two operators, there is no system of accounting at any of the mines. As yet there is such small precedent for trained administration in this section that a deplorable lack of business method in nearly all of the mining operations results. A unit basis for the cost of production is an unheard-of refinement. From the figures that are available, it seems quite evident that there is little material difference in the treatment of 10 per cent. dirt or 3 per cent. The prevalent practice of installing a poor grade of machinery has often resulted in a high milling expense from frequent delays and repairs.

The actual cost per ton is a figure which is far from being the absolute criterion of plant economy, and if one but considers for a moment the latitude of mill recovery throughout this field, he will at once be aware that higher costs frequently obtain with a greater saving to the company. The labor and supply factors of expense are somewhat uniform here, and with the exception of a few properties, where transportation facilities are poor, a fair grade of coal can be had at the mill for something like $4 per ton. Good jigmen or mill foremen are paid from $75 to $100 a month in Wisconsin, while backhands vary from $2 to $2.25 per 10-hour shift. The feeders and pickers are rated at $1.50 to $1.75. In few cases do any of the mills operate more than one 10-hour shift per day, and these are almost invariably of the smaller 50-ton type.

Below is found a table of costs at the Trego Mine No. 1, for about nine months of operation. The figures are not to be interpreted as altogether representative



PLAN SHOWING GENERAL ARRANGEMENT OF 180-TON CONCENTRATOR PLANT.

of the district, as in this mill the work was done with more than usual care and the costs and recovery were therefore correspondingly higher than the average.

Milling Cost Statement at Trego Mine, No. 1.

	Per ct. Yield Blende.	Tons Milled	Cost per ton.
January	16.3	784	.95
February	12.5	1296	.76
March	Mill shut down.		
April	18.4	767	.59
May	6.8	1005	.83
July	10.2	1496	.83
August	6.6	1466	.47
September	4.5	910	.68
October	23.8	1492	.72
Average cost per ton			$0.68

Apparently there was no material difference in the cost of treatment for the high or low grade material, and the only point deserving of notice is that the lower costs are gained with the increase in quantity handled. It is at once evident that what was needed here was a greater continuity of operation. That the actual cost will ever be as uniform, or as low, as in the Joplin practice, is not altogether probable, but it is also to be noted that in the case of the more intilligently designed Wisconsin mills, the recovery will be greater than in the Missouri fields. There are at present a few plants where the costs are in the neighborhood of 45 c. per ton, but here again the figure is hardly an exponent of the intrinsic economy of the work, for the plant recovery is so low that the losses are far from compensated by the smallness of the dressing charges.

The cost of mill construction in this section ranges from $6,000 to $15,000. With a 50-ton plant, the lower figure is a fair average depending somewhat upon the mine location and resultant shipping facilities. As in Joplin, the general practice is to make use of a flat mill site, entailing considerable saving in the initial cost. The plants of 100-ton capacity, or above, cost from $8,000 to $15,000. Below is given an itemized statement of material used in the construction of a 180 ton plant, erected four miles from railroad:

General Cost Statement for 180-Ton Mill, Potosi, Wis.

Lumber	$1935.65
Machinery	4015.79
Belting	586.75
Pulleys	124.03
Pipe, fittings and valves	265.34
Common brick, 14,000	93.50
Fire brick, 3000	76.35
Hardware	177.98
Copies of drawings	7.15
Freight and express	247.31
Two tanks	51.48
Nails	71.61
Cement	47.35
Lime	7.25
Hauling	195.40
Labor	1953.58
Paint	50.52
Miscellaneous supplies	18.78
Total	$9925.82

The crushing machinery for the above equipment was largely brought from the Missouri foundries, and the mill was in every way adequate for the cleaning of the rated amount of brecciated ore. The jigs themselves are, as a rule, from six to eight compartment Cooley-type, with sieve areas of from five to nine square feet. Their bodies are built up of 2 x 4 in. No. 1 white pine with wicking laid between to make them tight, and these are set upon secondary rock filled foundations which, in turn, are borne by longitudinal concrete ribs. This arrangement permits of little vibration and the entire foundations are independent of the mill structure. The crushers and rolls are mostly identical with the types and grades seen in the Joplin mills. Naturally, in Wisconsin, the roll shells have considerably greater longevity owing to the comparatively soft gangue material with its freedom from cherts and flints.

On the whole, there seems to be a growing demand for more intelligence in both the design and operations of the plants, and the influx of progressive interests has done much for the betterment of both mining and milling conditions. Although all units here are unusually small, there is being developed a commendable standard for economy and efficiency of dressing.

In an article on the synthesis of ruby, Mr. Sallior remarks that their qualities as jewels are inferior, but they are not false stones, because chemically, physically, mineralogically and optically, the synthetic ruby is similar to the natural one.

Mines in Panama

Consul James C. Kellogg, of Colon, reports that gold quartz in pockets is found in numerous places in this republic, but deposits are so small and scattered that it does not pay to hunt for them or work them when once found. There is only one gold-quartz mine that is a paying investment. This is in the province of Panama, on the Pacific side of the republic, and has been operated for some years. On the Isthmus of Panama there are no gold mines in operation, and none has been worked since the mine at Santa Rica, in the province of Colon, was abandoned after thousands of dollars had been sunk in the venture.

INTERIOR VIEW ON JIG FLOOR.

In recent years valuable deposits of manganese ore have been found near Nombre de Dios, in the province of Colon, and American investors organized the Manganese Mining Company, which paid large dividends until forced to close down by a depression of prices.

Coal seams are found in many parts of the republic. In the province of Bocas del Toro a very good grade of bituminous coal was discovered, but it was so far back in the interior that it was not a paying investment. In the Isthmian Canal Zone coal veins were found by the French during their occupancy of this territory. This statement seems to be verified by the reopening of an old coal seam on the Negrito river. Recently two other places on the same property, but on a lower level, were bored, and it was reported that a coal seam 3 ft. thick was discovered.

Domestic Coke Manufacture.

BY F. W. PARSONS.

The use of domestic coke as a fuel is fast growing in favor, and the manufacturers of coke are turning their attention to this new branch of their industry, in anticipation of a largely increased business.

It has generally been the custom to ship the coke in regular coke cars, loading in the same condition, as to size, that it was when drawn from the oven, the only breakage being that which occurs from handling and transportation. This coke has been principally made for, and used in blast furnaces.

The large municipal, or local, gas companies, which supply illuminating gas to our cities, began first to turn their attention to the profitable disposal of the large quantities of coke produced at their works. This resulted in many experiments to determine the economy and efficiency of their coke product as a fuel, and much literature was published and circulated to attract the attention of consumers.

The coal companies, which operate coke plants in connection with their mines, are now turning their attention also to the domestic coke trade, and are attempting to crush and size a part of their coke output and sell this portion for domestic use. The large companies have employed experts to teach the public how to use coke in their furnaces, and in keeping with the rapid advance of this business, the furnace manufacturers themselves have attempted to produce a furnace better adapted for burning coke. Along with this has come the demand for domestic coke, from the Chinese laundrymen in San Francisco, New York and other large cities, until now the market is one worthy of much consideration. Especially is this true when we remember that the slack coal used in making coke has heretofore, in many instances been thrown away, or sold at a price that hardly justified the trouble of handling it.

In the accompanying sketch is shown the general arrangement of a domestic coke plant capable of producing 50 to 100 tons per day, at a comparatively small initial outlay.

The coke, after being drawn from the ovens upon the coke yard or wharf, is wheeled to the upper end of the yard, and dumped into an 18x24 in. chilled-tooth, double-roll coke crusher. The product, after passing through these rolls, drops into a boot and is there caught by a bucket elevator. The buckets should not be smaller than 7x12 in., and should run 75 to 100 ft., a minute, according to the speed of the rolls, and the output desired. The elevator carries the coke to the top of a bin on the opposite side of the coke track, where the buckets dump it into a chute, which carries it to a revolving cylindrical screen. The screen should be covered with No. 8 plate, the first half with ¾-in. circular perforations, and the remaining half with 1½-in. perforations. The screen dimensions should be 6x24 ft., and the slope should be 1:6 or 1:8, according as to whether it is to be run slow or fast. Many experienced superintendents prefer to operate the cylindrical screen by a bevel gear working into another gear, placed on the outer rim of the spider, rather than have a bevel arrangement working directly on the shaft. This of course applies to any revolving screen.

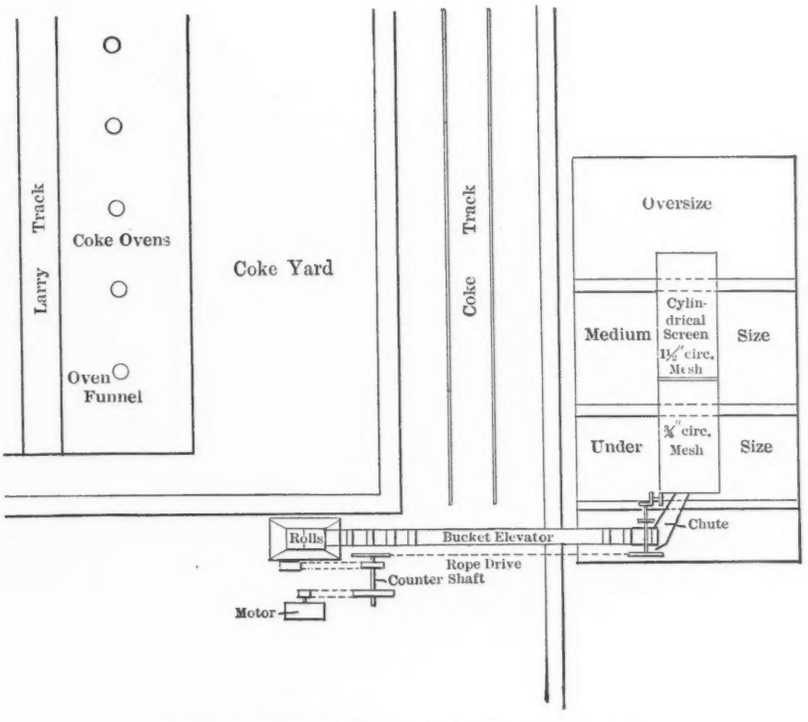


DIAGRAM OF ARRANGEMENT OF COKE-CRUSHING PLANT.

The product from the screen is therefore produced in three sizes, viz., undersize, medium, and over-size. The undersize or breeze, is at present not salable, but could be utilized in making briquets.

The bin into which the crushed coke drops, has three separate compartments, each compartment for one of the sizes of coke. The bottom of the bin is hoppered toward the coke track and covered with steel plates, or a layer of fine cement. This gives a smooth sliding surface with good wearing quality. The gates at the bottom of the bin allow any grade of coke to run through a chute into a box-car. One 25-h.p. motor would run such a plant and two men could easily operate it. In case of a much larger output, further refinements would be needed; a box-car loader could then be used and a pan or belt conveyor to feed the rolls would be necessary. The rolls, elevator, cylindrical screen, driving machinery, etc., exclusive of motor, for such a plant as I have described, would cost $1000 f.o.b. factory, The cost of bin would be approximately as follows: 40 M. ft. lumber at $25 per M., $1000; carpenter labor at $9 per M., $360; iron bolts, $150; chutes, lining, etc., $125; total, $1,635. Adding cost of machinery, $1000; freight, $150; grand total, $2785.

The above estimates are based upon actual experience.

The Swedish Iron Industry.

In the report of the Swedish Ironmaster's Association for 1905 it is stated that the year was a remarkable one in the annals of the Swedish iron trade. The exports of pig iron amounted to 110,400 tons, the largest quantity on record for any single year. The exports of ingots, bloom iron, and rough bars also show a great increase. The rolled and hammered goods exported during the year reached unprecedentedly high figures.

The total export of bar iron, small sizes, billets, steel of all kinds, tubes and parts of tubes, sheet iron, and bar ends during 1905 was 215,000 tons as compared with 193,000 tons in 1904. The production of pig iron in 1905 was 527,300 tons, a small increase over 1904; and of bloom iron 178,700 tons, a decrease, compared with 1904; of Bessemer ingots 77,900 tons, also a decrease, while in Martin ingots the production was 280,200 tons, an increase of 35,000 tons. Martin metal continues to grow in favor in Sweden, while the employment of Bessemer metal shows a falling away. The iron industry is said to be suffering under the high prices for charcoal.

Labor-saving Machinery in Coal Mining.

BY F. W. PARSONS.

The substitution of mechanical devices to replace manual labor has been the study of engineers for many years. Especially has coal mining benefited from the practical application of mechanical devices for drilling and handling coal. Many mines now worked at a profit would be unprofitable, were we to return to the primitive methods of cutting, hauling and handling, that were in use only a few years ago.

It is possible in the short space of a single article to deal but briefly with the great advances made in underground mining methods. We are familiar with the comparative efficiency of air and electricity as a power for drilling, hauling and cutting coal. Each system has its advocates and local conditions often determine which style shall be adopted. In gassy parts of a mine, the safe installation of electric haulage and electric machinery is a serious problem, due to the danger from sparking and imperfect insulation. On the other hand, if we ignore the danger resulting from contact with live wires, the ignition of gas and the difficulty of repair, we find that there is less loss of efficiency in the use of electric power than in compressed air.

Probably the greatest advance in underground mining machinery is that which has taken place in electric undercutting machines, where one machine will make a continuous undercut across the face of a room or entry, without changing jacks, or removing props. No manual labor is required in loading, unloading, or while the cut is being made. The successful substitution of machines for bringing down coal, in place of powder or other explosives, promises to be one of the most important inventions of the present period. These machines are small, compact, derive their power from hydraulic compression and are now used both in America and Europe, although they have not been introduced on a large scale.

It is outside of the mine, however, where we are especially cutting down labor, and reducing the names on our pay rolls. This often means the initial expenditure of several thousand dollars for equipment to do the work mechanically.

One of the most important considerations in the handling of coal is the fact that it must not be broken, and methods of handling it as though it were iron or copper ore are not sensible. The character of the coal generally determines what care must be taken in dumping it, and how often this process can be repeated. In shaft mines, the use of a skip for hoisting is not advisable on account of the extra dumping and consequent rough handling; but actual experiment has shown a satisfactory saving, and increased production, without affecting the commercial value of the coal, by using a self-dumping cage and specially designed cars. The operation is simple; the cars run upon the cage, each wheel resting on a block or chair; as the cage starts, it does not engage or move the car until the bottom of the cage touches the bottom of the car. The wheels of the car are now caught in the openings in the bottom of the cage, which hold the car securely until it is hoisted, dumped and returned again to the chairs at the bottom of the shaft. The dumping in this case is accompanied by less jar and consequently less breaking than when the car is run off the cage and dumps, against a horn, upon the screens. The action of this self-dumping cage is similar to that of a skip; there being a wheel on each side of the cage, which engages a variably curved track and this leads the top of the cage out of its vertical position and causes the car to dump its contents. Such a cage weighing 5000 lb., complete with dumping angles, chairs, etc., will cost $900. With two such cages running in a double compartment shaft, the output is limited only by the number of loads that can be delivered at the shaft bottom.

The coal that is hoisted and dumped by the cages slides into an open top, flat bottom, carrier conveyor. This conveyor should have overlapping buckets, 24 x 36 x 12 in., and should run on 6-in. cast iron, self-oiling rollers. The head shaft should be 5 7/16 in. diam., the foot and countershafts each 3 7/16 in. diam., the chain links should have a 24-in. pitch. Such a conveyor will handle from 1000 to 1500 tons of run-of-mine coal in eight hours, carrying it from the shaft to the horn, or top of the domestic screens. By allowing the cages to dump the coal into a hopper arrangement, which feeds a constant stream to the center of the conveyor, we have a steady run of coal over the screens and into the railroad cars, with only a small amount of breakage.

A conveyor, with 70-ft. centers, such as described here, with driving machinery and everything complete excepting the initial motive power, will cost $1200. The entire cost of two self-dumping cages, conveyor, etc., with necessary equipment and including installation, will cost $3175. In this method, it is best to weigh the coal in the mine before pushing the car upon the cage, and, if this is done, one man can operate the whole system on the surface. When we compare this arrangement with a plan where three to five men are necessary, it is evident that the saving in labor is well worth considering.

Another important matter to consider is the disposal of the ashes from the boilers. If there is some nearby creek or river into which the ashes can be washed, and there is also a plentiful supply of water to form a current for carrying away this waste, then the problem is as good as solved. In case, however, the ashes are being hauled away in a cart or shipped in railroad cars, the problem is less simple. Let us consider also in this connection the handling of the waste rock from the washery, which may have to be loaded into cars and shipped by rail to a dumping place. Oftentimes, where the mining company is building a railroad or sidings, the plan has been to utilize this waste rock, or coal, for ballasting the track, which is a great mistake, as the waste slacks and crumbles, making a very shaky and unstable track.

A better plan for disposing of the waste rock and the ashes is to install an aërial tram of either a continuous or two-bucket type, with movable clips along the line so that the point of dumping can be moved whenever desired. The buckets of such a tramway should hold from 12 to 20 cu.ft. (preferably the latter, if it is a two-bucket tramway). Each cubit foot of waste from a washery will weigh approximately 120 lb. There should be a terminal bin with a W-shaped bottom, located conveniently near the boiler house, and the washery. After catching the waste from the jigs, in a settling tank, it is carried in a perforated bucket elevator and dumped into the terminal bin. In a similar manner, the ashes after falling through the grate bars into the ash pit, which has a concrete bottom, and is kept constantly full of water, are raked out into a pan, or flight conveyor, which runs just in front of and immediately below the boilers. This conveyor carries the ashes from all of the boilers out of the boiler house, and then dumps them into a steel boot, where they are caught by a bucket elevator and carried up into the terminal bin. The ash conveyor running through the boiler house should have an iron or steel framework, and cover. This is only a matter of precaution, since the ashes drawn from the pit are supposed to be thoroughly quenched.

The actual machinery required for handling the ashes from a boiler house employing four boilers, was as follows: One double beaded flight conveyor, 62-ft. centers, using 256 ft. of roller chain, and 384 twelve-inch, No. 1 steel, double-beaded flights, also including angle irons, bolts, runways, sprockets and all driving machinery complete. Besides this horizontal conveyor, there was installed an elevator with 38-ft. center, to carry the ashes from the boot to the bin. This elevator required 82 ft. of chain, with 5x8-in. buckets placed every foot, and raised the ashes through a vertical distance of 30 ft.

The bucket conveyor which carries the waste rock from the settling tank to this same terminal bin has 56-ft. centers, and lifts through a vertical distance of 38 ft.

In this conveyor, there is 236 ft. of extra heavy roller chain, with 12x30-in. perforated buckets placed every two ft. The buckets are of No. 12 iron, with ¼-in. perforations, and travel only 30 ft. a minute, this slow speed being desired, so that the buckets will drain thoroughly. The capacity of this elevator is easily 15 tons an hour, with reserve power sufficient to handle 20 to 25 tons in case of an emergency.

The cost of an ash conveyor, an ash elevator, and a waste elevator, such as we describe here, installed complete with all driving machinery excepting the motor, would be $1300. A two-bucket aërial tramway, capable of carrying away all this waste rock and ashes, having a length of 2000 ft., with three 30-ft. towers, two 45-ft. towers, one 60-ft. tower, and a tail tower, would cost $3600. This includes 4200 ft. of 1¼-in. locked-coil track cable, the most expensive, so far as first cost is concerned, of all wire cables, the two buckets, ⅝-in. traction cable, driving machinery, and all iron used in the construction of the towers. The six towers and the tail tower require 30,000 ft. of good quality lumber, which at $20 per M. ft. b.m. costs $600. There are 10,000 ft. of lumber required in the terminal bin, which at $20 per M. ft. b.m. and including $50 worth of iron, makes it cost $250. The construction of the terminal bin and the towers, with proper management, can be done for $10 per M. ft. b.m., or if given by contract, can be let for not more than $11 per M. ft. b.m. including the iron work, so that the cost of complete installation of the aerial tramway will vary from $400 to $500. If we total the cost of such an installation for the disposal of waste and ashes as we have here described, we will have:

Ash conveyor and two bucket elevators, complete with driving machinery.....	$1,300.00
Aerial tramway machinery and iron compl-te.....	3,600.00
Lumber for towers and terminal bin, 40,000 ft. @ $20 per M. ft. B. M. and including $50 worth of iron for bin.....	850.00
Installation @ $11 per M. ft. B. M.....	440.00
	$6,190.00
Add.....	309.50
Total.....	$6,499.50

To this estimate must be added the freight charges, as the prices for machinery here given are f.o.b. factory.

The shipping weight on all the machinery here included can be safely estimated at 50,000 pounds.

The power required for driving all the conveyors and the aërial tramway need never exceed 25 h.p., and can be done by one motor, whose speed is reduced by substituting a countershaft and pulleys. It is also advisable to remember in planning for an aërial tramway that it should run perfectly straight, and avoid all angles or curves. It is generally better to go over obstacles than around them, for each angle in the line not only increases the cost materially, but complicates, and seriously retards operation.

The Rack Rail Haulage System in Coal Mines

The advantage of mechanical haulage over animal haulage for coal mines, is now thoroughly established. Rack rail haulage is a new system, which has recently been described in the *Iron and Coal Trades Review.*

The use of animals on the main haulways is almost obsolete except in very small mines, and in all new operations of any magnitude, mechanical haulage in the main entries is generally employed. The use of animals for gathering coal from the working face to the main parting is still prevalent, but the electric locomotive is gradually invading this field, and we may confidently predict that in the early future the mines of progressive operators will be worked without animal haulage in any portion.

Of the various types of mechanical haulage that have come into use in coal mines, the electric locomotive has seen the greatest development. Traction locomotives are, however, limited by grades and work best on flat hauls. They immediately meet with disadvantages when the haulage departs from the level, and the disadvantage rapidly increases with the increasing pitch, the machine becoming thoroughly impracticable when the gradient exceeds a few degrees. The reason for this is inherent, because the sole reliance for pulling effect is the adhesion of the driving wheels to the track due to the weight of the locomotive. The draw-bar pull of a locomotive equipped with ordinary chilled cast-iron wheels and on a level track, is about 20 per cent. of its weight. When it is on a 1 per cent. grade, 1 per cent. of its weight must be deducted from its draw-bar pull, which is, therefore, reduced one-twentieth, or 5 per cent. On a 5 per cent. grade the draw-bar pull is 25 per cent. less than on the level, while on a 10 per cent. grade it is 50 per cent. less than on the level. These figures apply to a locomotive all the wheels of which are driven by a single motor. If each axle of the locomotive is driven by a separate motor, its draw-bar pull is still further reduced by reason of the fact that less than one-half of the weight of the locomotive is on the upper wheels, which, therefore, tend to skid and become ineffective, leaving but one motor to do the work. The horse-power capacity of the locomotive is therefore reduced to the horse-power of one motor. This will reduce the draw-bar pull 50 per cent., and from the remaining 50 per cent. it is necessary to deduct 5 per cent. of the initial draw-bar pull for each per cent. of grade. On a 5 per cent. grade this leaves but 25 per cent. of the initial draw-bar pull for effective work, and on a 10 per cent. grade it leaves nothing; it is a well-known fact that a traction locomotive can get itself up a 10 per cent. grade, but cannot pull up it any considerable effective load. The effectiveness of such a machine on a grade is, of course, somewhat increased by the use of sand, but while sand is effective for starting, or for a short grade, it cannot be depended upon for a long up-hill pull. The excess weight on the lower wheels will, moreover, jeopardize the motor driving these wheels by overloading it, because the motor is designed with sufficient capacity to slip the wheels when they carry one-half of the weight of the locomotive. The increased weight results in more power being required to slip them, and if the motor is not capable of carrying the over-load so created, it burns out.

To illustrate this concretely, consider the case of a 10-ton two-motor locomotive on a 5 per cent. grade. Its normal draw-bar pull on a level track is 4000 lb.; 25 per cent. or 1000 lb., must be deducted as representing the effort required to lift the locomotive on the grade of 5 per cent. If now the upper wheels start to slip because they carry less than one-half of the weight of the locomotive, the draw-bar pull is reduced 50 per cent., or to 2000 lb., from which 1000 lb. must be deducted as above set forth, leaving an effective draw-bar pull of only 1000 lb. A single-motor traction locomotive in which all track wheels are driven by one motor makes a much better showing on a grade because one pair of wheels cannot skid, but all are forced to revolve at the same speed. But even with this style of traction locomotive, and under the most favorable conditions, the effective draw-bar pull drops off 5 per cent. for each per cent. of grade.

The seriousness of this decrease in the draw-bar pull becomes more apparent when one considers the need of additional draw-bar pull imposed by the grade. The draw-bar pull required to move nine cars on a level track is from 1½ to 2 per cent. of their weight. Every per cent. of grade up which the cars are pulled makes necessary an additional draw-bar pull of 1 per cent. of the train weight. The 10-ton locomotive referred to above, with its draw-bar pull of 4000 lb., would, therefore, on a level track pull a train weighing 200,000 lb., on the basis of 2 per cent. being allowed for draw-bar pull. If the train ran on to a 1 per cent. grade, the draw-bar pull of the locomotive would be reduced 5 per cent., or to 3800 lb., whereas the draw-bar pull required by the train would be 3 per cent. of its weight, and the resulting train weight that could be pulled up this 1 per cent. grade would be 126,600 lb.—a decrease of 37 per cent. If the grade became 2 per cent., the resulting train weight that could be pulled would be 90,000 lb., a decrease of 55 per cent. If the grade became 3 per cent. the train weight would be reduced to 68,000 lb.; if 4 per cent., to 53,300 lb.; and if 5 per cent., to less than 43,000 lb., or about 22 per cent. of the train weight that could be hauled on the level track. These figures do not take into

consideration the deleterious effects of skidding, and are, therefore, applicable only to single-motor locomotives. A two-motor locomotive would not make so good a showing as this.

It is apparent from the foregoing that for grades there is required some form of haulage more positive in its nature than a traction locomotive, and one which does not involve moving so much dead weight up and down the grade. Such a system may be found in rope haul and in a rack locomotive. A rope haul lacks flexibility, is controlled by an engineer located at a point remote from the trip, and permits the running of only one train at a time in the entry, thereby necessitating running at very high speed. Each of these is a serious disadvantage, which is eliminated by the use of locomotives, and the disadvantage is so great that there are many instances where traction locomotives are used on grades for which they are totally unfitted, in order to escape operating a rope.

The rack-rail locomotive combines the positive feature of the rope haul with the flexible features of the locomotive, and is designed to solve the haulage problem in hilly mines where the gradient is less than 15 deg. When the gradient is greater than 15 deg., a rope should be used, and where the haulage is level, a traction locomotive should be used.

The rack-rail haulage system consists primarily of an iron rack anchored to the ties between the rack rails, and an electric locomotive provided with sprocket wheels, which run in this rack. The rack is used in some cases as a conductor, and then takes the place of a trolley wire; in other cases it is used only for the mechanical purpose of propelling the locomotive. Two classes of locomotives are made, one of these is a plain rack-rail locomotive, designed to operate only where the rack rail is laid. The other is a combination rack-rail and traction locomotive, and is designed to run either as a rack-rail locomotive or as a traction locomotive. These locomotives are built in units of 80 h.p., and of 100 h.p. When greater horsepower is required, the larger type units are run in tandem, thus making locomotives of 200 h.p.

The plain rack-rail locomotive consists of a continuous-current series-wound motor mounted on a four-wheel truck. A sprocket wheel is mounted on each axle, and revolves loosely upon it, and a train of gears connects the motor armature with the sprocket wheels. The track wheels serve only to carry the weight of the locomotive, and this weight is made no greater than is necessary to provide mechanical strength of parts, thus eliminating the great amount of dead weight carried by traction locomotives. The sprocket wheels and gears are free to move along the axle one inch either way from a central position but are held in the central position by springs. This flexibility allows for irregularities in the relative position of the track rails and the rack.

The combination locomotives differ from the plain locomotives in that their track wheels, as well as the sprocket wheels, are driven by the motor, and they are equipped with a sanding device. When the rack is used as a conductor in place of a trolley wire the rims of the sprocket wheels are insulated from the driving hub by wood blocks, these being first treated to prevent absorption of moisture.

The rack rail consists of bar iron 5/8 in. thick, and varying in width from 4 in. to 4½ in. This is perforated with holes 1⅝ in. square, and is made up in straight pieces 16 ft. long. These 16-ft. pieces are built into a continuous rail by the use of fishplates in a manner similar to that used in ordinary track construction.

This rack is laid between the track rails sufficiently higher than the latter to permit the points of the sprocket teeth passing over them. In those cases where it is to serve as a conductor in place of a trolley wire it is supported on wooden stringers, and protected with a wooden covering. This wooden portion of the rack rail structure consists of four parts. First: A bottom stringer which is 6¾ in. wide, and is spiked to the ties. Second: Spacing blocks which are 6¾ in. long by 4 in. wide, and are spiked to the stringer at 18 in. centers. Third: The lower covering strips which are spiked to the spacing blocks, and have a recess provided in their upper surface to receive the rack; and fourth: The upper covering strips which are spiked and bolted to the lower strips, and are identical in cross section with them, and which serve to hold the rack down and also protect it against accidental short circuits. In cases where the rack is used for mechanical purposes only, the bar is rolled with a bevel edge on each side, and is supported on malleable cast-iron chairs, which clamp it to a bottom stringer. The bottom stringer is similar to that used for the insulated rack, but is a thicker and narrower. The iron chairs are spaced 12 in. centers, and are used in pairs, the pair being held together by a bolt, which serves to clamp the chairs to the rack and the stringer.

At turnouts and crossings the rack is cut to permit of the track rail crossing it. At such places suitable fittings are provided to connect together the ends of the rack by an iron bar passing under the transfer track rail. In cases where it is necessary to cut out more than 26¾ in. of the rack, a throw rail or switch, is provided. When the rack is used as a conductor in place of a trolley wire, an insulated bonding cable of about 250,000 circular mils cross section is used to connect together the ends of the rack at such breaks. This makes the rack electrically continuous.

When the locomotive is a combination machine, the rack is discontinuous, being only used on the grades. These discontinuous pieces of rack terminate at each end in an "approach" which is a heavy steel casting bolted securely to the rack and so shaped that it forces the sprockets to engage properly with the rack.

The rack-rail system of haulage has been successfully installed in coal mines, and there is now in daily service apparatus aggregating upwards of 15,000 n.p. The Alliance Electrical Company, Limited, of London, is making a number of these installations in the United Kingdom.

Gold Mining in British Guiana.

Prof. Angelo Heilprin, who recently made a trip up the Essequebo as far as the Omai and Crab falls, said in an interview: "I was for several days a guest at the camp of the Demerara Exploration Company, located at about two miles from Omai Landing, and was greatly surprised at the extent of the operations which were being conducted there. Located in a large clearing in the heart of the primeval forest, one is surprised to find the comforts of home, an extensive electric installation, and other conveniences for which the surroundings hardly prepared one: The system of hydraulicking which is here practised for the breaking up of solid rock is exceedingly interesting.

"Extreme difficulties must be encountered in any geological survey of a region so densely wooded as British Guiana, and when, consequently, so little opportunity is presented for studying outcrops, there is no region where the difficulties of examination and study are greater than here. Another interesting feature connected with the works at Omai was the installation of the huge dredge, the operations of which are to be conducted on an ancient flat of the Essequebo river.

"The scenery of the lower part of the river hardly prepared me for the prospect that opens out from the clearing of the Demerara Exploration Company. It extends in practically an unbroken sweep across forest, hill, and mountain, to the watershed of the Amazon, and to a point in close proximity to the Brazilian frontier. From the headquarters of the managers of the company the eye falls westward and south-westward, and on the broad depression of the Conawarook, over forest covered ridges that trend off to the Kaiteur plateau, over dome-shaped spurs, 20, 30, and 40 miles distant, with elevations ranging manifestly over several thousand feet, and framing in a picture of a mountainous character wholly different from that to which the eye is accustomed in the off lands which constitute the baser plain of the colony. Into this vast sweep of forest and mountain lands the prospector and gold-digger are now extending their operations, but the greater part of the region still remains all but unknown, except, perhaps, in its more salient features."

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*Illustrated.

Anthracite Activity.

The complete subordination, to which the small operators in the anthracite country of Pennsylvania have been reduced, does not seem to discourage new enterprises. There has not been a time in many years, if ever, when so many of the small remaining tracts of coal land have been taken up, or when they were so much in demand; and besides new land, some abandoned collieries have been bought, with a view of reopening them. Some of the purchases have been made by the large companies, but several have been bought by small companies and firms, who will constitute a new body of independent operators.

The Mining Districts of the Day.

Of the mining districts of the United States, which are especially attracting attention at the present time, Wisconsin, Utah, Nevada, Arizona, and Montana are pre-eminent. Wisconsin is of special interest on account of the new development of its historic old zinc mines, while Utah, Arizona, and Montana are attracting attention particularly because of their great copper resources.

In view of the increasing importance of these districts, and our desire to keep our readers closely informed as to their progress, we have recently caused special correspondents to visit the principal mining centers in four of these States. The interesting series of articles by Mr. Woodbridge on Arizona were begun in the JOURNAL, several issues back, and will run through July. In our next issue we shall begin a highly valuable series of articles on Wisconsin, by a member of our staff, and in the following issue an important series of articles on Utah, which will be followed by a series on Nevada.

Gold Statistics.

In our statistics of gold production of the world, published in our issue of Jan. 6, 1906, we credited Australia with an output of $85,522,125 in 1905, the United States with $86,337,700, and the Transvaal with $101,295,960, these figures being based on returns for the first nine months, or more, of the year, and estimates for the remainder. The complete figures for Australia show a slight gain over our estimate, so slight a gain, however, as to be a gratifying confirmation of the accuracy of the latter, but yet sufficient to make it doubtful for awhile whether Australia or the United States would be entitled to the second place in gold production. The second place was naturally claimed by the Australians. It is to be regretted that we are slower in reporting our statistics than are most of the other large gold producing countries, the only excuse for which is that our conditions are more complex. So far as it has yet been possible to revise the statistics published at the beginning of the year, the total gold production in the United States in 1905 was $87,948,237, an amount which is exceeded only by the Transvaal.

The Situation in South Africa.

The views which are expressed by our special correspondent at Johannesburg, in the letter printed elsewhere in this issue, are an excellent exposition of the feeling among conservative mining men on the Witwatersrand with respect to the present status of the labor question. The policy of the Liberal Government in offering to repatriate such of the Chinese as desire to return home, cancelling the bargain into which they previously had entered, after precise and honest explanation of the conditions, is certainly demoralizing.

It would have been better to have despatched a commission to South Africa to determine absolutely the facts as to the behavior of the Chinese, and their treatment by the employers, and if abuses had been discovered, to recommend proper methods for their rectification. Instead of this, a policy had been declared, which is calculated to excite uncertainty, and general demoralization. Under the circumstances, the great anxiety which is now felt by the mine managers and the mining engineers of the Transvaal is not to be wondered at. It is to be hoped that there is still time to reverse the present policy, and settle the question by a cool consideration of its points on a purely industrial basis.

It is interesting to note that, during the first ten days following the posting of the repatriation notices, only twelve Chinese came forward to take advantage of the offer, which apparently confirms the results of certain official inquiries, namely that the Chinese themselves are satisfied with their situation.

The Indiana Coal Agreement.

The agreement just concluded between the Indiana coal operators and miners has

some features which deserve attention. In it the operators concede the 1903 scale of wages, for which the miners have been contending, but they receive some concessions in return. Arbitration is provided for in case of any minor differences which may arise; and for the first time in this country, this clause provides penalties for strikes and lockouts. The miners agree that they will not strike in case of any local disagreement, before submitting the case to the arbitration board; and any such stoppage of work is to be punished by a fine of $1 a day per man.

On the other hand, should the operator shut down his mine in case of trouble, before submitting the case to the board, he is to be fined $50 a day for the time it is closed. This clause does not apply to the closing of a mine for plain business reasons. All fines collected are to be divided equally between the Miners' Union and the State Operators' Association, giving both bodies an interest in enforcing the agreement. This is expected to put an end to local strikes for petty causes, which have been a serious grievance in the past.

The addition of this penal clause to a labor agreement is a new thing, in coal mining at least. It looks like an evidence of intended good faith on both sides, and there will be much interest taken in its working. We may add that it involves a complete recognition of the miners' union, upon which will devolve the enforcement of the agreement. The contract is explicit and carefully drawn, leaving no room for doubt as to its provisions.

Overwinding in Hoisting.

One of the most distressing accidents in hoisting from mines is overwinding, i.e., the failure of the engineer to check the speed of the engine in time, through some derangement of the machinery, or through mischance or carelessness, and the consequent running of the cage up into the head sheave, when the men may be thrown out to the floor of the shaft-house, perhaps 50 feet below, or the cable may break and the cage and men may fall to the bottom of the shaft. The passage of the cage above the landing level, with almost certain prospect of being wound into the head sheave, which has been described by some who have escaped fatality, is an acute agony, which thankfully few have experienced.

Overwinding is guarded against by numerous mechanical devices, and every fresh accident stimulates inventors to the design of new contrivances. These devices fall into three general classes, viz., (1) Those which depend upon the use of some kind of detaching hook, placed betwen the cage and the rope, the purpose being that when the cage reaches a certain point in the upper part of the head frame, the detaching hook comes into contact with a releasing apparatus, which unlocks the hook and frees the rope from the cage. (2) Arrangements for automatically shutting off the steam and applying the brakes to the winding engine. (3) Arrangements for cushioning the cage as it rises into the head frame.

The efficiency of devices of these various types is discussed by Prof. Robert Peele in an excellent paper in the *School of Mines Quarterly* for January, 1906. Professor Peele points out that none of the detaching hooks really prevents overwinding; they merely do what is possible to avert or mitigate the serious consequences resulting from it. Some detaching hooks are found to work satisfactorily with moderate hoisting speeds; such as may be attained by geared engines, say up to 1200 or 1500 ft. per minute, where the momentum of the cage is comparatively small. But no detaching apparatus can be used successfully with the high velocity reached by a heavy cage and load hoisted by a large direct-acting engine. The rope may be freed at the last moment, but a tremendous shock and some damage are inevitable. It is true that the cage is prevented from being pulled clear over the head sheave, an accident which has actually occurred, and after the collision the wrecked cage may be supported by the detaching apparatus, but if men are on the cage they would have a poor chance for their lives.

Professor Peele is equally positive in his condemnation of the general type of automatic contrivances for shutting off steam and applying the brake. In his opinion there is not one that is, or can be perfectly satisfactory in dealing with high hoisting speeds. Incidentally, he makes the interesting note that according to a recent decree of the Belgian government, whenever men are being hoisted in a shaft a capable assistant is required to be near the engineer to replace him in case of sudden indisposition; and like the engineer, he must devote his entire attention to the signals and workings of the engine.

In conclusion, Professor Peele remarks that there is a very simple method by which much may be done toward easing the shock of an overwound cage as it rises in the head frame, viz., by cushioning or gradually destroying the momentum of the cage. This may be accomplished by long powerful spiral springs, encircling the guide ropes above the surface landing, when guide ropes are used; or if the guides be of the ordinary timber construction, the head frame can be made extra stiff and strong, and the guides be brought gradually closer together, beginning at a point just above where the cage ordinarily comes to rest upon the landing chairs. If then the cage should rise too far, the guides bind upon it tighter and tighter, and the cage is brought to rest by the frictional resistance without a dangerous shock. This plan is undoubtedly effectual, for the cage will wedge itself so tightly that (even if the rope should break) it cannot fall. It has been used for some time in France and Germany, and has been proposed in this country. It cannot fail if the head frame and guides are sufficiently strong and unyielding to exert an elastic compression upon the sides of the cage when the latter rises too far.

In these opinions, we thoroughly concur. The efficacy of the suggested device is merely a matter of properly adjusting the strength and taper of the guides, so as to bring about a gradual pinch of the cage between them. A similar device can probably be adapted to the prevention of overwinding in connection with hoisting by buckets. For this purpose, a tapering box might be arranged at a suitable hight in the head frame, into which the bucket will go, in the event of overwinding, and stick fast to the desired end, that is to say the stoppage of the engine and its own suspension. We are unaware that this expedient has ever been tried, but we have seen a case where because of a movement of the sides of the shaft, while the bucket was at the bottom of the latter, upon hoisting it pinched into the lining of the shaft and stuck so fast that considerable effort was required to dislodge it. In this case, there was probably some carelessness in using too large a bucket, but it points out clearly the possibility of arranging a contrivance of the same character for the intentional prevention of overwinding.

Metallics.

The Scranton tunnel of the Lackawanna & Wyoming Valley Railroad cost for excavating and lining, including the shaft, practically $90 per lineal foot.

The new concentrating mill of the Boston Consolidated Mining Company is to be equipped with Nissen stamps. It is said that 600 of these stamps will be used in the mill.

At the Washoe Smelting Works, at Anaconda, Mont., the flue dust is briquetted by mixing it up into a stiff mud and passing it through a machine of the pug mill type, such as is used for the manufacture of ordinary building brick.

To reduce the radiation losses to a negligible quantity, the Interborough Rapid Transit Company, at its subway and elevated railway power houses, uses two layers of pipe covering, each approximately 1½ in. thick. The sections are put on so that all joints are broken.

The steam superheater has now been developed to such a point that 200 or 300 deg. F. can be safely and economically obtained in commercial work. As a matter of fact some power plants are using steam superheated to a much higher degree than this.

At the Lincoln wharf power station of the Boston Elevated Railway, a Westinghouse poppet-valve engine and two McIntosh & Seymour Corliss valve engines are being used on superheated steam at a temperature stated to, at times, reach as high as 550 to 600 deg. F. The expected trouble with lubrication has not materialized to such an extent as to be troublesome.

The cycloidal blower, known to most furnace men, was the result of an attempt to build a water motor. It was originally intended to operate the mill, but being constructed of wood, swelled on being put into use, and upon being belted to a line shaft for tests, after the swelling had been cut out, its air-blowing properties were noticed and a machine was built for foundry use.

In excavating wet, or clayey earth, or mud, by hand, it is a good plan to use a shovel having perforations in the bottom. This allows the air to reach the under side of the material held in the shovel and prevents its sticking to it when the shovel is emptied. Wetting the shovel before it is inserted in the material to be handled will also tend to prevent the mass from sticking to the metal.

It is 30 years since the Otto gas engine was first introduced, and it is only within the last few years that the larger sizes of engines of this type have been placed upon the market. As a matter of fact, the gas engine is today the most efficient motive power known. Its lack of development in the past was largely due to the delay in effecting an inexpensive method of making a suitable gas for combustion in engines of this type.

In a certain case of overwinding, the cage happened to be provided with a detaching hook. When the men found that they were going to pass the landing level, they jumped out of the cage and were seriously injured. The cage, however, was successfully caught in the head frame, while the end of the rope, with its heavy capel, on being released, described a half-circle over the engine house and partially stripped the roof, besides doing other damage.

The life of a hoisting rope is largely dependent upon the relative position of the drum of the engine and the sheaves; also by their relative diameters. Every change in the direction of the shaft involves a deflection in the line of the rope and adds to the friction and abrasion of the rope, thereby reducing its life. Corrosion of a hoisting rope by acid water is generally more marked at the capel end, because the water that gathers on the rope runs down to the capel.

The most important objection to the gas engine as a prime mover is that its range of economical load is limited. Between 50 per cent. load and full load it is efficient, but it has practically no overload capacity. For the electrical power plant this is an almost fatal defect, unless an additional expenditure for a storage battery to help out the peak be incurred. In the latter case, the economy of the prime mover is overcome by the expense of maintenance and the interest and depreciation costs on the battery.

In steam engine work the cylinder losses increase with the difference in temperature between the steam and exhaust portions of the cycle, or, the greater the thermal range of temperature, the greater the loss in condensation. This fact is responsible for the economy obtained in the use of a higher number of cylinders. At least, it points to that conclusion. The use of additional cylinders, however, involves additional first cost and friction, increased space, and often increased maintenance charges.

An inventor (sic) has suggested a combination that is as startling as it is novel. He proposes the use of a gas engine having poppet-valves and water cooling. The water is circulated in the cylinder jacket but is not, according to his statement, to be cooled or added to. It is kept circulating until transformed into a highly superheated steam, at which time the gas which has heretofore operated the engine is to be shut off and this superheated steam used until condensation sets in, when the steam is to be automatically switched off and the gas turned on again, the same cycle of operations being carried on continuously.

In the steam turbine, there being no thermal cycles of heating and cooling at each stroke, as in the reciprocating engine, an almost perfect adiabatic expansion can be expected. The drop from the steam valve to the condenser is a nearly ideal thermal condition. This is relatively more nearly true in the low-pressure stage of the turbine than in the low-pressure cylinder of the engine, and it has therefore been suggested that the reciprocating engine should be run at high pressure (where it is relatively more efficient than the turbine) and that the turbine should be utilized for the low pressure part of the cycle.

Instances given by H. G. Stott, of a recent test of a 7500-h.p. reciprocating engine, show a mechanical efficiency of 93.65 per cent. at full load, corresponding to an engine friction of a little over 6 per cent. In this case the lubrication of all principal bearings is done by the flushing system, in which a large quantity of oil is put through the bearings by gravity from elevated reservoirs. After it has passed through the bearings it is returned to oil filters and then pumped up to the reservoir tanks for further use. About 200 gal. per hour are used on each engine of this size, and only about 0.5 per cent. of it is lost.

The wooden block pavement that is being introduced so largely in and about New York is a treated long-leaf heart pine. The material is first cut into blocks, and subjected to 80-lb. steam pressure in a cylinder, which then has the pressure gradually lowered, and the blocks are submitted in the same cylinder to the action of a vacuum for considerable time. While under this action, a mixture consisting of 55 per cent. creosote and 45 per cent. ground resin is introduced. This preservative is absorbed by the wooden blocks, which are then subjected to a further and higher pressure, to drive the mixture into all the fibrous interstices. After the pressure has been reduced the material is dried and taken out ready for use.

A good apparatus for applying dressing to a hoisting rope consists of a cylindrical wrought-iron framework, made in halves, which is clamped around the rope and held by two attendants standing at the top of the shaft. The apparatus is divided into three compartments, the uppermost containing a stiff-bristled circular brush, which cleans the rope and prepares it for the oil. The oil is contained in the middle compartment. Beneath this, there is placed a wad of cotton waste to prevent the oil from running through. In the lowermost compartment is a soft brush to spread the oil evenly over the rope. In operation the rope is unwound slowly down the shaft, passing through this apparatus. The part of the rope which does not go down the shaft has to be treated on the drum with a long-handled tar brush.

Colliery Notes.

In computing the amount of water it is necessary for the pumps to handle in a coal washery, it is easy to remember that each ton of coal washed, requires approximately one ton of water.

Careful attention should be paid the question of coal consumption, in the generation of steam at collieries. It seems to be forgotten that every ton of coal saved at the boilers, from careful efficient firing, or other well ordered system, is an extra ton available for sale; and its commercial value is as great as any other ton of coal sold to the consumer.

The size of tools, and consequently the size of the core extracted in diamond drilling, depends on the character of the material, and the depth of the hole. When operating in anthracite coal, hard rock, and other firm measures, it is best to employ a small bit and extract a core of from 1 to 1.25 in. diameter, when drilling no deeper than 700 to 800 ft. When prospecting in bituminous coal, or other soft material, the outfit should be larger, and extract a core 2 to 4 in. in diameter.

A prominent member of the Royal Academy of Belgium, who has spent several years in demonstrating the presence of comparatively rare elements in the coal-measures of Liège, is now enabled to add chromium and vanadium to his list of elements already discovered. These last two elements are obtainable not only from the soot derived from the combustion of coal, but from an appropriate treatment of the coal measure shale. These discoveries are important for the reason that they are opposed to generally accepted theories concerning the nature and chemistry of coal deposits.

The process of generating heat and absorbing oxygen is known as oxidation, and is necessary in the spontaneous combustion of coal. Heat is a movement of atoms and molecules, changing their distances from each other, and the marsh-gas, carbon-dioxde and nitrogen, inclosed in the pores of the coal, are liberated. Pyrite in the coal, is oxidized into sulphurous and sulphuric acids, the heat developed by chemical action dries and heats the coal, and if air be admitted it ignites and burns. The amount of bromine with which coal is able to combine, determines its capacity for spontaneous combustion.

The higher the compression in a gas engine, the weaker must be the mixture, that is to say, the ratio of air to gas increases with the compression. Broken crank shafts and bed plates, as well as cracked breech ends, are generally due to the lack of strength and stiffness of the engine. A gas engine requires to be built on the lines of a gun, since its action is of similar nature; therefore engines of the vertical type cannot have the stiffness which is present in the horizontal engine. When the running of an engine gives rise to shock or knocking, it is likely that the speed is too great. Current practice for a 500-h.p. engine, would be about 135 r.p.m. with a piston speed of 700 ft. per minute; but the engine would do better at 120 r.p.m., with the same piston speed.

The prevalence of "miners' phthisis," which is generally assumed to be caused by the inhalation of fine dust produced by the drills, has resulted in the Transvaal Chamber of Mines offering a prize for the best device for combating the disease. The judges, after considering 229 answers, awarded the first prize and a medal to the inventor of an atomizer, as being the most efficient and practical device. This atomizer lays 75 per cent. of the dust, and besides assisting ventilation, removes the nitrous fumes from explosives. If lime-water be used, carbonic acid can also be removed. On the other hand, it requires extra attention, separate mechanism, a perfectly pure water-supply to the mine, and necessitates the men working in an atmosphere supersaturated with moisture.

A system of haulage with endless ropes naturally brings to mind the consideration of rope speed. Experience has shown that a speed of one and a half miles per hour tends to reduce the casualties, breakages, and stoppages experienced at greater speeds. Such a speed as here stated is especially advisable when the haulage system is fed uniformly for large outputs; when the standage space at the pit bottom is limited; and when the supply is entirely dependent upon one main way. In this connection, while speaking of endless rope haulage, it is well to remember that there comes a time when the car axles and wheels, through wear and tear, or by accident become weak and defective. Short sidings, placed at intervals, and fitted with a sling switch, are useful to shunt the cars into, pending repairs, so as to minimize delay. Any defect in the system underground, becomes a serious hindrance to a constant and even output.

The question as to which one of the numerous explosives is best suited for certain kinds of work in mining can be determined by tests conducted in cylinders cut from a solid mass of compressed lead. Cylinders made in this way are more equal in quality and more homogeneous than cylinders made of cast lead. As to size, it should be 5 in. in diameter and 8 in length, with a bore hole of 0.5 in. diam. and 5.5 in. depth. Eight grams of explosive is sufficient, and should be exploded with detonators fired by electricity. The tamping of dry, sharp sand is further compressed by placing a 150-lb. lead weight on top of it. The strength of the explosive is calculated by measuring the enlargement of the hole after the firing. As to the accuracy of this method, it was found that duplicate shots rarely showed a difference as great as one per cent.

The periodical talk concerning the probable exhaustion of the world's coal supply, is about due to appear again. If we will remember the following approximate figures, there will be no cause for alarm: The world's present consumption of coal is nearly 1,000,000,000 metric tons. At this rate, Europe could supply the world for more than 500 years. America could furnish the world's coal for almost 700 years, while the coal areas of China, Africa, and South America are known to have billions of tons of coal, although these fields are but scarcely touched. From the known coal now estimated, and considering the consumption as twice what it is at present, there is a sufficient available quantity of this fuel to last the entire world at least 800 years. The countries nearest to a coal famine are Austria, Belgium, Russia and France. England has coal to last her 300 to 400 years. America need not worry for 800 years, and Germany can count on a supply even longer than this.

American mine managers, as a whole, must awaken to the necessity of an observance of the laws of sanitation and hygiene in their mines. How many colliery superintendents ever seriously consider the damage caused by the unclean habits of the miners, or devise plans to remedy the faults? Practically no legislation has ever been enacted against the evil practices now in vogue, and certainly few competent men have thoughtfully investigated the subject. In Europe much work has been done toward the accumulation of statistics and the devising of means for a remedy. Figures resulting from a careful microscopical examination of 188,730 miners, showed that 17,161 or 9.1 per cent. were worm-affected. Comparing these figures with those previously available, shows that the disease is decreasing, due to the measures adopted against it. Further investigations show that the disease is almost entirely absent, among the children and female relatives of the miners. It has been found that men medically treated in the hospital, and discharged as cured, have become worm-affected again after a short time in the mines. Sprinkling the mines has been partially discontinued, to see what effect the diminution of moisture would have, but up to the present time no particular result has been noticeable. The principal benefit has come from the erection of a suitable system of closets on the surface and from the desiccation of the ground. Especially has the question of soil-and-water disinfection been considered, with the result that satisfactory effects are found to be produced by a strong solution of sodium chloride or of sulphur dioxide.

Correspondence and Discussion.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

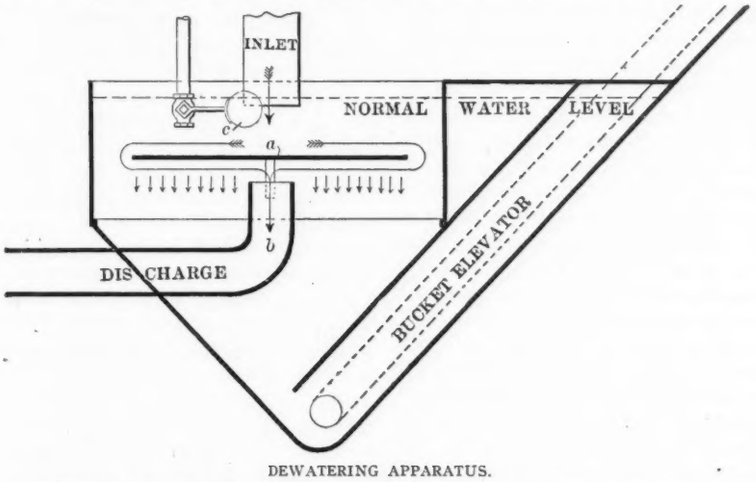
Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Recovery of Water from Coal Washers.

Sir—In the JOURNAL of April 7, 1906, F. W. Parsons, contributed an article on the recovery of coal-washer sludge. Among other things he said: "It has been the custom for some years past to run washed coal through a cylindrical screen having fine meshes, and then pump the water and slack coal, or sludge as it is called, up into a tank at the top of the washery, just over the washed coal bins. The sludge is here allowed to settle, the water is run off into the fresh-water tank lower down, while the slack coal is dropped from the sludge tank into the bins. This requires an expenditure of much power and can be avoided by separating the water from the waste rock and slack coal on the ground floor."



DEWATERING APPARATUS.

Such was my experience when chief engineer of the Tennessee Coal, Iron & Railroad Company, at its shaft No. 1 washer, Pratt mines, Ala. When the second washer was installed, this time at slope No. 2, to obviate these difficulties a cylindrical sludge tank which gave a fairly good separation, was designed. In this particular instance, however, all the settlings were wasted, it being found that the ash ran over 50 per cent. and sulphur proportionately high. This sludge tank, with some modifications, will do everything the sludge tank Mr. Parsons describes, and would not have as much machinery. A tank with the necessary changes is shown in the accompanying sketch.

It is cylindrical in section at the top, and funnel shaped at the bottom. In the tank near the top is a circular deflecting plate, *a*, but this deflecting plate may be made conical in shape. The water running from the screens charged with fine coal, or sludge, is delivered into the top of the tank, and in the center, so there may be an even discharge and uniform flow over the entire surface of the plate and off its edge. The flow of the water in the tank is indicated by the arrows in the sketch. The fine particles of coal, owing to their specific gravity, drop from the current, as indicated, into the comparatively still water below the level of the mouth of the discharge pipe *b*, which may act as the pump supply pipe, and collect in the bottom of the tank. From here the fine coal is removed by means of a perforated bucket elevator, which is enclosed to a point above the normal water level line, so as to prevent any waste of water. The diameter of the deflecting plate in the tank is a point dependent on the amount of sludge it is desired to remove, as too small a plate would allow too much of the sludge to flow direct to the pump through the discharge pipe *b*. Once regulated for a given coal, the results are always as good as is possible with the ordinary rectangular sludge tank. In connection with the tank, if desired, is the valve which supplies the fresh water needed, but which supply is regulated automatically by the float *c*. There are today probably fifty of these tanks in operation in various parts of the country.

ERSKINE RAMSAY.

Vice-president and chief engineer Pratt Consolidated Coal Company.

Birmingham, Ala., May 17, 1906.

Rapid Multiplication.

In the issue of this JOURNAL (May 19, 1906, p. 959) J. H. Robinson gives a short method of squaring. I have thought it might be of interest and possibly new to some of your readers to give a method which I have used for multiplication for some little time. The operation is briefly as follows, but it can only be applied to figures, one of which at least is capable of factoring.

Suppose the product of a certain number by 84 be required, the multiplication can be done mentally. It simply requires the placing of figures on the paper. The first multiplication in the case noted is that by the factor 12, which is used as a multiplier, and the result as the multiplication is mentally carried on, is written down. The next multiplier is 7, the product of the previous multiplication is used as the multiplicand; and with the writing of this product, the operation is concluded.

NIMMO BOUSH.

New York, May 22, 1906.

The First Tube Mill in Metallurgy.

Sir—Will you allow me to differ from your correspondent, R. F. Abbé, in your issue of May 26 in respect to the first tube mill in metallurgy. The first tube mill used for metallurgical purposes of recent date was worked on the Red River tin streams, Cornwall, England, at least 15 years (perhaps 20) earlier than November, 1894, the date mentioned by Mr. Abbé, and was built at the Basset foundry, Carn Brea, R. S. O., Cornwall. I cannot give the dimensions but should say the mill was fully 12 ft. in length, and about 2½ ft. in diameter, and was used for crushing sand to slimes, for which purpose scrap iron was used.

A CORNISHMAN.

Sault Ste. Marie, Ont., May 28, 1906.

Engineering Ethics.

Sir—An interesting question has been recently brought to my attention. I refer particularly to the confidential nature of professional reports on engineering investigations. It has been my own practice, as it is that of most other engineers of my acquaintance, to regard such reports as confidential in all cases, with the single exception of reports on the work of other engineers. In these cases, I have made it an invariable rule, as a matter of professional courtesy, to see that the engineer whose work was investigated received a copy of my report.

This practice I believe to be general among all engineers. I know that the same courtesy has invariably been extended to me by engineers called in to report upon my own work; I have generally found the most prominent engineers to be most punctilious in this respect, some even going to the extent of informing me, beforehand, that they had been retained for the purpose, and have stated what ground they expected to cover in the report.

The practice noted in the first paragraph is so general that it is usually understood, and where it is not so understood, it is usually the part of wisdom to make the acceptance of any retainer conditional upon the rendering of this courtesy. An engineer's duty to his profession is certainly of no less importance than his duty to his client.

J. H. GRANBERY.

New York, May 15, 1906.

Mines vs. Prospects.

Sir—The remarks of "Agricola," in a recent issue of the JOURNAL, on the essential difference between prospects and mines from the commercial aspect, are well to the point. The capital of New York is conservative in its search for legitimate investment; it utilizes the conservative judgment of the best engineers; and it discriminates sharply between those ventures which are speculative, and those opportunities which are investments. The distinction is too obvious to call for further comment; and too real to be neglected by promoters. But it suggests a further word of advice which it will profit the promoter to heed and to practice. The point is this: A good prospect may sometimes be converted into a mine by a reasonable expenditure of additional prospecting, exploiting with system, and checking and recording all progress with careful sampling. But this additional prospecting takes a small outlay of ready money. If the promoter can do this prospecting, he certainly should do it himself. If he cannot, of course he must call for help. But if he can do it, and will not, it betrays a lack of confidence on the part of the promoter in his own project.

CHARLES S. PALMER.

New York, May 29, 1906.

Separation of Blende from Barytes.

Sir: Your reply on page 1012 to J.O. B. on the separation of blende from barytes should include what I call the "decrepitation" method. Most, but not all, barite, when heated to say 200 or 300 deg. C., decrepitates, with the result that in a short time almost the whole is reduced to nearly impalpable powder, and can be separated from the non-crepitant blende crystals by sifting through a 40-mesh screen. Some tests which I made several years ago proved the practicability of the method for certain Missouri ores, and the process was actually operated by Captain C. B. Dahlgren at Cole camp, in Benton county, Mo., two or three years ago.

There have also been suggested several chemical methods depending upon the extraction of the blende by suitable solvents, some of which might be practicable under proper conditions. W. G. W.

Webb City, Mo., May 27, 1906.

The Broken Hill customs returns for the first quarter of this year show that, in spite of the fire at the mines, there was an increase in the value of the silver-lead concentrates exported. The total exports amounted to £550,115, the chief items being silver (in concentrates) 1,456,590 oz., value £118,826; lead (in concentrates) 898,200 cwt., value £317,853; zinc concentrates, 365,366 cwt., value £39,835; silver-lead ore 75,840 cwt., value £11,504.

The Riots at Cananea.

Governor Rafael Ysabel, of Sonora, and General Luis E. Torres, commander of the Northern zone, united in the following signed statement:

RONQUILLO, Mexico, June 5.

Since day before yesterday order has been re-established, and public tranquility is increasing more and more every moment in this mining district. A review of the things which have happened is as follows: On the first day of the month a group of workmen, all Mexicans, abandoned their work, declaring a strike. Going through various departments of the business, they induced other workmen to join them, and went to the lumber yard, where entrance was denied them by the superintendent of the office, Mr. Metcalf. Their animosity being inflamed by this denial, a conflict resulted. The Americans threw a stream of water from a hose upon the Mexicans, and in the riot the American, Mr. Metcalf, was killed, the office and lumber yard were burned, and two Mexicans died. A general disorder followed. The American employees of the concern armed themselves and their partisans on one side, and the strikers on the other; the result being three Americans killed and ten Mexicans.

The night was passed in comparative tranquility. On the second day hostilities were renewed, but the announcement of the coming of Governor Ysabel contributed to calm the minds of all. The governor came at 10:30 a. m. and went through the town, accompanied by Colonel Greene, president of the mining company, and two other persons representing the Government. They found a number of groups of excited Mexicans, who listened to the warnings of the governor, but kept on their arms. In the same way the American employees of the company remained armed. In the afternoon, and without any known reason, there was a new disturbance, and firearms were discharged in various parts of the town, as a result of which two Americans and six Mexicans were killed and a number were wounded. Governor Ysabel endeavored to repress this disorder, but he did not have the forces to do it, inasmuch as among the Americans and Mexicans there were more than 3000 men, many of them armed. The local police force was tireless in the discharge of its duty, but it was small in number.

In the afternoon of the same day at two o'clock there arrived 43 *Rurales* and 30 guards of the Fiscal Gendarmes. The night was passed in relative quietness. On the morning of the third day 70 men of the Federal forces arrived, and 20 of the National Guard. Gen. Luis E. Torres came on the third day at 7 a. m., having proceeded from Torin Rio Yaqui, where he received the news. Immediately after his arrival he joined in the work of the governor, seconding all his efforts.

We repeat that order has been established and public tranquility is more firmly established each moment. Since the night of the 2nd instant an order was issued that disarmed everybody who was carrying arms, Americans and Mexicans alike, and some arms have been seized. Yesterday and day before yesterday passed without the slightest sign of disturbance. Business has been resumed, and more workmen are returning to the mines and shops. For the information of persons whom you serve with news we state that the population of Cananea is something more than 20,000 people, scattered in villages stretching over the valleys and foothills for a length of six miles.

LUIS E. TORRES
RAFAEL YSABEL.

It will be noticed that there is no mention of the employment of the 200 Arizonians who were summoned to the rescue of their countrymen and welcomed by the Mexican Governor. As a matter of fact, they did not fire a shot; the service they rendered was to overawe the rioters until enough *Rurales* arrived to restore order.

J. S. Douglas, superintendent of the Moctezuma Copper Company, of Nacozari, Sonora, proceeded to Cananea upon receipt of the news of rioting at that point, and upon his return confirmed the report that normal conditions again prevail at Cananea.

"Americans on this side of the line and in Sonora," said Mr. Douglas, "are grateful to Gov. Ysabel for his prompt action taken to protect lives and property at Cananea, even at the risk of bringing down criticism upon his own head from the Mexican people. His action in taking the armed volunteers from Bisbee under his escort, 220 strong, Saturday morning, although they did not fire a shot, had the moral effect of preserving peace until the arrival of Col. Kosterlitzky's troops."

We have received the following telegram, dated June 8, from A. S. Dwight, general manager of the Greene Consolidated Copper Company: "The Cananea troubles are settled, and the excitement has subsided. All departments of the company are in operation to about three quarters capacity. The only actual destruction of property which took place was the burning of the lumber yard by the mob on Friday afternoon, with a loss of approximately $100,000. The entire industrial camp and town were threatened by the same mob of over 2,000 men, but were saved by the prompt action of the armed American employees, who as auxiliaries of the police, dispersed the mob and subsequently helped the authorities to maintain law and order until Saturday noon, when Governor Ysabel arrived, escorted by 200 Americans from Arizona who had voluntarily placed themselves under the Governor's orders. The regular Mexican troops arrived in the afternoon, and the Arizona men then withdrew, avoiding in-

ternational complications. Their withdrawal was as honorable as their arrival had been timely; in fact, the behavior of the Americans in this crisis has been generally distinguished by the quiet self-restraint that accompanies the highest type of manhood. The Mexican State police and military are now in complete and efficient control of the situation. They deserve the greatest credit for their attitude and for the results. We anticipate no further troubles whatever."

The Sault Ste. Marie Canal.

The Cleveland *Marine Review's* report shows that, notwithstanding the delay in shipping caused by the longshoremen's strike during the first two weeks of May, lake commerce as measured by the locks at Sault Ste. Marie, has been the heaviest on record up to June 1, exceeding the commerce of 1905 by 776,592 tons. The movement up to June 1, 1906, was 7,852,545 tons as against 7,075,953 tons up to June 1, 1905. This heavy commerce has been handled in the face of obstacles, as there has been congestion at both upper and lower ports, and the ore movement was not free at any time during the month.

The mineral freights included in the total were as follows, in short tons, with the exception of salt, which is given in barrels.

	1905.	1906.	Changes
Anthracite	215,128	101,954	D. 113,174
Bituminous	843,829	1,111,263	I. 267,434
Total coal	1,058,957	1,213,217	I. 154,260
Iron ore	5,139,574	5,176,649	I. 37,075
Pig and manuf. iron	32,616	70 136	I. 37 520
Copper	22,005	23 089	I. 1,084
Salt, bbl	112,038	80,853	D. 31,185

Of the freight this year, 1,465,386 tons were west-bound and 6,387,159 tons east-bound. The number of vessel passages this year was 3841, showing an average of 2049 tons to the cargo.

Mine Accidents in Western Australia.

The report of the State mining engineer of Western Australia for 1905 gives the following statement of accidents for the year:

	Killed.	Injured.	Total.
Explosions	9	13	22
Falls of ground	12	61	73
In shafts	5	15	20
Miscellaneous	5	91	96
Total underground	31	180	211
On surface	3	90	93
Total	34	270	304

The most important single cause of accident was falls of ground. In a few cases these accidents were due to carelessness in placing timbers; but the report says that in most mines reasonable care is exercised.

Commercial copper sulphate contains about 25 per cent. of copper.

The California Miners' Association.

SPECIAL CORRESPONDENCE.

San Francisco has witnessed the "passing" of many things since that fateful 18th of April when the earthquake occurred and the great fire began. Aside from the hundreds of millions of dollars worth of property destroyed, the catastrophe suddenly ended the existence or usefulness of numbers of associations, organizations, clubs, etc. Larger and stronger ones are being resuscitated, but many will not survive the disaster, or if they do at all, with much lessened membership and influence. Among those which received a "body-blow" is the California Miners' Association. Its headquarters in the Stock Exchange building on Pine street were destroyed with the building, and all the records, papers, library publications and property of every description went up in smoke. Moreover, the proceedings of the last annual convention, with all the manuscripts, plates, engravings, etc., were destroyed at the printers' office. The proceedings were all in type, indexed and ready for the binder, so that in a week they would have been distributed, and the advertising contracts made good. The organization now exists only in name, with its officers and committees, and it is doubtful, even if continued in existence, whether it will ever be revived with anything like its former prestige and influence. Most of the members who have been its main support are no longer in a position to contribute to the finances, and without these little or nothing can be done. It has always been the case that 80 or 90 per cent. of the financial receipts have been derived from residents of San Francisco; the interior counties doing much less than their share, considering the objects of the association. The machinery men who have been regular yearly contributors will not be in a position to continue their donations, and the individuals have their own more important business to attend to. Doubtless the energetic and active president Mr. Tregidgo will, in due time, attempt to revive interest in the association but he has an uphill task at hand. Of late years there has been less and less interest manifested, from season to season, and it is more than probable that the San Francisco men will, for a time at least, let the miners of the interior fight for their own interests, with little help from the metropolis.

It has been noted, that while Banka tin is very pure on the surface, when produced from lower down it sometimes contains 4 to 5 per cent. of iron. As refining is not always done satisfactorily, the Indo-Netherlands Government, proprietor of the Banka mines now, intends to offer two kinds of pig at its public sales—viz., tin guaranteed pure and tin alloyed with a small percentage of iron.

Coal-Mining Rules in Alabama.

SPECIAL CORRESPONDENCE.

In order to minimize the loss of life and injury to property in mining operations, State Mine Inspector J. M. Gray has been sending out a set of directions which he will enforce in Alabama, subject to the approval of the Board of Mine Foremen Examiners. The rules are set forth in the following communication which he has sent out to every mining company in the State:

"Section 20 of the mine law makes it the duty of the Chief Mine Inspector of Alabama to give directions to the mine operators, owners and general managers as to the method and manner of working gaseous mines and the manner of working and propping the roof in all mines. Among the general directions that the Chief Mine Inspector expects to give, subject to the approval of the Board of Mine Foreman Examiners, are the following:

"1. All coal to be mined or cut—either will answer—in rooms, crosscut and narrow work before it is shot. (a) The cutting of the room or chamber on one side or the center of a place and working the place in steps, say slabs of 3x5 ft., or 4x6 ft., will be considered cutting; in other words, in this way one side of the shot will have a loose side, and one cutting in the face will give a row of slab shots across the place. (b) All holes to be tamped full with non-combustible tamping.

"2. No dynamite is to be used on the coal without written permission from the mine boss.

"3. No shot must be fired where it depends on another shot for a show to do its work; and when shooting on a rib the miner must notify the men in the room, or place, next to his shot before he lights his shot; not wait until after he lights it to notify them.

"4. All augers for shooting coal to be cut off to 6 feet.

"5. Cutting shots, or crackers as they are termed, must not be fired under any conditions.

"6. In gaseous mines crosscuts to be made in rooms at such intervals as the mine inspector examining it thinks proper. In non-gaseous mines at least one crosscut to the room, and more if the inspector thinks it necessary.

"7. Where gas is found in a mine the fire-boss must examine every working place in the mine every morning—and old work every two weeks—before the men go in to work. Said fire-boss must put the date of the month on the coal in the room with chalk, to show that he has been there. If gas is found in a place, danger-boards must be put up at mouth of room and in each crosscut to the room on both sides of the room, or places where the gas is found.

"8. No man—miner or anyone else—

must attempt to brush out the gas without a safety lamp to examine the place with, to see if it is all out. When brushing gas all open lamps must be blown out where gas is liable to be brushed onto them, or swept by air current, on them. This means blown out, not set back at the crosscut, but the light blown out.

"9. Miners must set props at regular intervals in all places as soon as room is made for them, whether they think there is any danger or not. The distance apart will be governed by local conditions of the roof in different mines. If a miner cannot get props he must lay idle until he can get them. The companies to be governed by Section 12 of the mine law.

"10. Places that the mine inspector, making the inspection, wants put through quick shall have free turn, regardless of local rules at mine governing turn.

"11. The foreman or his assistant must visit each working place at least every other working day. In gaseous mines fire-boss must vist every day as by rule 7.

"Section 20 of the mine law makes it the duty of the chief mine inspector to prescribe the method and manner of working coal mines in the State, and I am writing you this letter to put you on notice that in making new contracts for next year you will bear in mind that any violations of the rules made by this department, now or hereafter, will be prosecuted. See also sections 30, 37 and 39 of the mine law."

The letter above quoted was sent to the head officials of the union miners' organization also. Explosions in mines in this State in the past few years have caused considerable discussion in regard to the mining operations, and when the next Legislature meets there is no doubt that efforts will be made to secure several changes in the present laws.

The new zinc smeltery of the Schlesische Gesellschaft at Kunigundehütte, Upper Silesia, and the new acid works are now in full operation. It is proposed to double the rolling mill capacity at Kunigundehütte.

Abstracts of Official Reports.

Palmarejo & Mexican Goldfields Company.

The report of this company, which operates several large properties in Chihuahua, draws attention to the steady increase in profits, and to the effective development work which is being carried on under the supervision of T. H. Oxnam, of Los Angeles, California.

The report, although only recently issued, deals with the fiscal year ending June 30, 1905. It shows that the total operations of the company amounted to £91,745, being an increase of £12,650 over the previous year. Of this amount £28,336 was net profit, as against £23,987 in 1904. Dividends amounting to £16,914 were distributed, while £11,836 was expended in new plant and development work. The balance of the profit account amounting to £6,184 was carried forward.

During the period reviewed the ore output of the Palmarejo mine amounted to 2,923 tons per month, or a total of 35,076 tons. In addition to this, 6,054 tons of picked ore were taken from the mine dumps and crushed. The average assay value of ore mined was $3.68 gold, in addition to silver running 20 to 25 oz. per ton.

A longitudinal section of the Palmarejo workings is shown in Fig. 1. Work is being carried on in the old Hundidos stopes above the Socorro level with satisfactory results. This ground was formerly opened up by the Mexicans, who left a large amount of good ore. Last year the company extracted 25,701 tons of ore from these workings, and the prospects for a large extraction of similar ore during the present year are good.

Developments in the intermediate and sixth levels are also promising, and the management looks favorably upon the prospects showing in La Blanca vein in the sixth level, and in the water winze below the Socorro level. It is estimated that 300,000 tons of average grade ore are now opened up for working.

The average cost of mining ore in the Palmarejo mine is $3 (Mexican) per ton. Development expenses average per foot as follows: Drifting, $10.75; crosscutting $11.50; raises, $8.39, and winzes, $10.44. While the cost in the Palmarejo mine is only $3 per ton, the cost in La Patria mine, which is not many miles distant, amounts to $4 per ton.

During the year the company carried out development work in La Patria mine amounting to 878 ft. The vein is 2 ft. 6 in. in width and assays $7 gold and 28 oz. silver per ton. Ore amounting to 2925 tons, assaying $9.59 in gold and 18.69 oz. silver per ton, was extracted.

Prospecting was resumed in the Guadalupe mine with satisfactory results. The vein at the bottom of the shaft at a depth of 300 ft. was found to be be 2½ ft. in width, with an average value of 29 oz. of silver per ton. This vein carries pockets of very rich silver ore. It is proposed to run a long cross-cut from the 240-ft. level in the Guadalupe to prospect the vein in La Colorado mine. Should this prove La Colorado vein to be valuable, extensive mining operations will be started on both the Guadalupe and La Colorado mines.

During the year the company's mill ran 328 days, the remainder of the time being lost through accidents due to severe storms. The mill is furnished with a large concentrating and cyaniding plant, which is working satisfactorily. The battery treated 45,798 tons of ore for a return of $187,461 gold and $1,185,509 silver, or $4.09 gold and 20.34 oz. silver per ton. Concentrate values of $249,339 were saved, the average contents being $0.726 gold and 3.25 oz. silver per ton of ore crushed. The cyanide returns were valued at $718,508. The cyanide extraction from concentrate amounted to 93.02 per cent. gold and 47.89 per cent. silver. The total saved, as per calculation on assays, was 58.19 per cent.; 16.42 per cent. being by concentration and 41.77 per cent. by cyanidation. The average actually saved by the cyanide process was 58.01

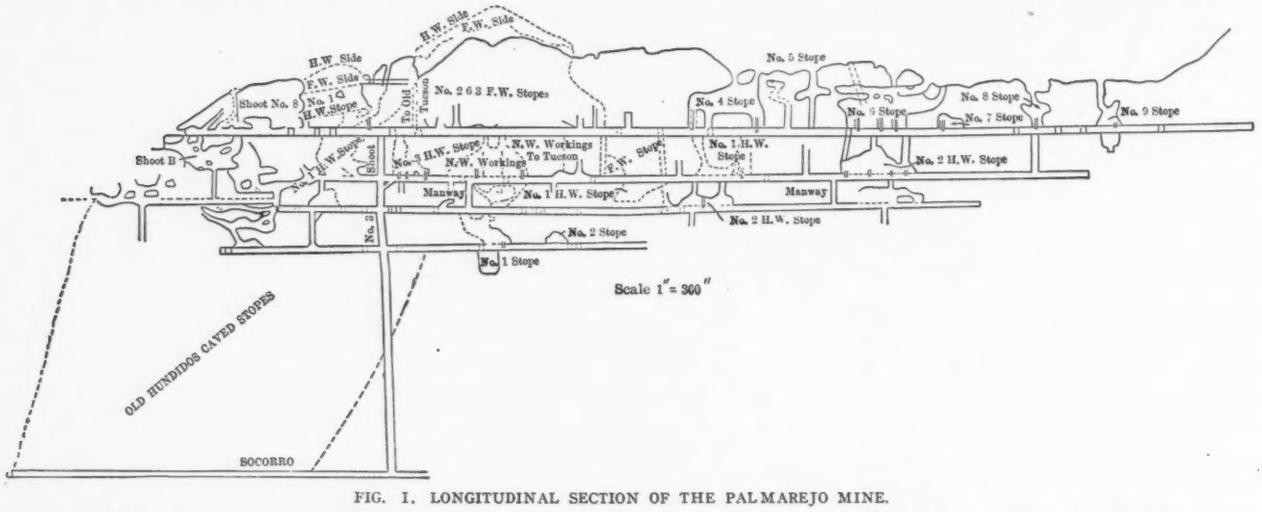


FIG. 1. LONGITUDINAL SECTION OF THE PALMAREJO MINE.

per cent. The consumption of supplies in the cyanide plant during the year amounted to 4.707 lb. lime, 0.852 lb. zinc, and 2.762 lb. cyanide of potassium per ton.

In addition to the above, the slime plant treated 7269 tons, assaying $4.50 gold and 49.90 per cent. silver per ton, for a return of $183,482, the saving being 74.03 per cent. gold and 49.90 per cent. silver, with a consumption of 12,423 lb. lime, 1.066 lb. zinc and 4.121 lb. cyanide per ton. In every case the costs and values given above are in Mexican currency.

The company's principal expense items were the following: wages formed 24.72 per cent., salaries 12.09 per cent., cyanide, 12.85 per cent., stores 6.21 per cent., mine development 5.68 per cent., zinc, 1.84 per cent., explosives 1.31 per cent., fuel 1.28 per cent., timber 1.27 per cent., lighting 1.26 per cent., taxes 1.02 per cent., and assay office 0.73 per cent.

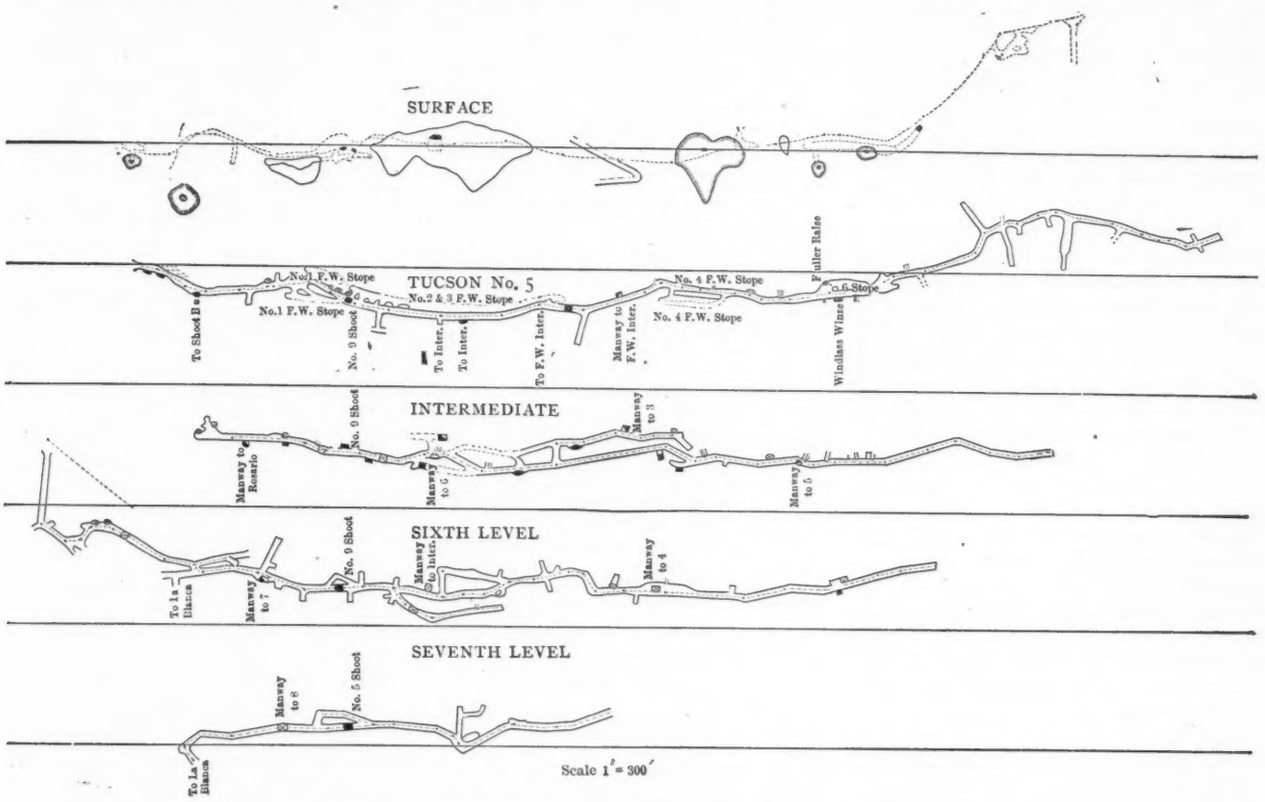


FIG. 2. PLAN OF FOUR UPPER LEVELS OF THE PALMAREJO MINE.

In *Glückauf,* W. Serlo describes the adoption of acetylene lighting in the Lorraine iron mines. At the present time 6000 iron miners in Lorraine, or more than half those employed underground, are using acetylene lamps.

A new mercury deposit is said to have been discovered at Wiederschwing, in Carinthia (Austria), a little to the north of the district of Carniola, where similar deposits extend from Idria to Neumarkt. The new deposit is said to be extensive.

Professional Papers.

The Menominee Range. John L. Buell. *Proc.* Lake Superior Min. Inst. XI, 1905. Pp. 38-49.

The Utilization of Exhaust Steam from Rolling Mill Engines, Hoisting Engines. Steam Hammers, etc., by Means of Steam Regenerators and Low-Pressure Turbines on the Rateau System. L. Battu. *Proc.* Lake Superior Min. Inst. XI, 1905. Pp. 50-70.

Iron Ore Analysis, Methods of, Used in the Laboratories of the Iron Mining Companies of the Lake Superior Mining Region. W. A. Siebenthal. *Proc.* Lake Superior Min. Inst. XI, 1905. Pp. 71-138.

Unwatering of the Hamilton and Ludington Mines. John T. Jones. *Proc.* Lake Superior Min. Inst. XI, 1905. Pp. 139-147.

Diamond Drill Holes, Determination of Angles of. F. A. Janson. *Proc.* Lake Superior Min. Inst. XI, 1905. Pp. 148-151.

Mining Supplies, Card System of Accounting for. W. M. Jeffery. *Proc.* Lake Superior Min. Inst. XI, 1905. Pp. 162-163.

Cargo Sampling of Iron Ores, at Lower Lake Ports, Including the Methods Used in the Analysis of the Same. W. J. Rattle and Son. *Proc.* Lake Superior Min. Inst. XI, 1905. Pp. 173-180.

Steel Ingots, Compression of in the Mold. A. J. Capron, *Eng'g.* (London), May 18, 1906. Pp. 667.

Steel Sheets, Brittleness and Blisters in Thin. Edward F. Law. *Eng'g.* (London), May 18, 1906. Pp. 669.

Gold Mines of Formosa, British Acting Consul Crowe. *Diplomatic and Consular Reports,* No. 649, Miscellaneous Series.

Cero de Pasco. Mining Laws of. Carlos E. Velarde. *Boletin* del Cuerpo de Ingenieros de Mines del Peru. No. 30.

Province of Cajamarca, Mineral Resources of. F. Malaga Santolalla. *Boletin* del Cuerpo de Ingenieros de Minas del Peru. No. 31.

Blast Furnace, Balance Sheet of the. J. W. Richards. *Electrochem. and Met. Ind.,* Apr., 1906. Pp. 129-132.

Fused Electrolytes, Factory Scale Experiments with. I. Edgar A. Ashcroft. *Electrochem. and Met. Ind.,* Apr., 1906. Pp. 143-146.

Extraction of Copper from Atacamite. Nicanor Argandoña. *Boletin.* de la Soc. Nac. de min de Chile, Feb. 28, 1906. Pp. 33-37.

Manganese Ore Deposits of the Central Province, India, Notes on. L. Leigh Fermor. *Records* Geol. Surv. of India, XXXIII, part 3, 1906, Pp. 159-220, Illustrated.

Metallurgy, Unsolved Problems in. R. A. Hadfield. *Eng'g.* (London), May 4, 1906. Pp. 601-603.

Transvaal Notes.

SPECIAL CORRESPONDENCE.

Such a time of anxiety has not been known in the country since the war days of 1899. In many ways the present is a more trying time than the months immediately preceding the war. Then people took a cheerful view of things, predicting that the war would be over in a few months, and the mines would start up soon after. But now there is a feeling of despair over the proposed action of the Liberal Government in regard to the repatriation of the Chinese.

Desperate efforts have been made to get sufficient Kaffirs as unskilled laborers for the mines. An unbiassed commission has stated that South Africa cannot supply the demands. Huge sums of money were then spent in bringing the Chinamen to South Africa. For months the Chinaman was an inefficient laborer. Just as he becomes thoroughly efficient, the Home Government comes forward with its proposition to repatriate free all coolies who want to go home.

The announcement has been received with indignation. When face to face with the proposition and all that it means, even the anti-Chinese advocates hesitate in agreeing to the repatriation of the coolies, who are at present absolutely indispensable. Meetings have been held, protesting most vigorously against the proposals of the Imperial Government. The repatriation of even a quarter of the coolies on the Rand will cause ruin and distress to many people. Everyone is determined to fight the proposals. It is quite likely that a large number of the coolies will take advantage of the free trip home, for it means to them a glorified holiday, after which they could return to the Rand. The statement that no coolies would be allowed to return to the Rand, after once leaving, would not be believed by the Chinamen.

The effect of these Government notices on the coolies will be bad. They have entered into a binding agreement to serve for three years in the mines. Suddenly they are exempted from this agreement by a power stronger than the law of the land. As it is, we have been continually hampered in dealing with the Chinese. These notices will reduce authority much more, and the Celestials will get more out of hand than ever.

A more inopportune time to make the proposals could not have been selected. Just now there is serious trouble with the Zulus in Natal, which might develop into a war. Kaffir labor is scarce. If the Government insists on this repatriation notice, and the coolies decide to go home in large numbers, there will be a panic such as South Africa has never yet known.

Hope has not altogether left us, although all sections vehemently protest against the mandates of the Home Government. People here will do everything posible to block the scheme of repatriation.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications, correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Published Week Ended May 29, 1906.

821,609. APPARATUS FOR PULVERIZING BLAST-FURNACE SLAG.—Heinrich Colloseus, Berlin, Germany. Filed Aug. 14, 1905.

821,615. MAGNETIC SEPARATOR.—Myron Dings, Milwaukee, Wis. Filed Sept. 15, 1904.

821,637. PROCESS OF TREATING ORES.—James O. Handy, Pittsburg, Pa. Filed Feb. 24, 1906.

821,743. AUTOMATICALLY-ANCHORING EXCAVATOR AND CONVEYER.—Edwin M. Reese, Yuma, Ariz. Filed July 22, 1905.

821,744. MANUFACTURE OF STEEL FROM PHOSPHORITIC IRON.—Jacob Reese, Sharon Hill, Pa., assignor to The Steel Patents Company, a corporation of Pennsylvania. Filed Sept. 23, 1905.

821,745. PORTABLE BALANCE.—Fritz Reichmann, Troy, N. Y., assignor to W. & L. E. Gurley, Troy, N. Y., a corporation of New York. Filed Jan. 17, 1906.

821,752. CONTINUOUS MAGNETIC FURNACE.—Henry C. Shaw, Glenshaw, Pa. Filed April 8, 1905.

821,808. DUMPING CAR.—John Knittel, Allegheny, Pa. Filed Jan. 29, 1906.

821,819. CONCENTRATOR FOR PULVERULENT MATERIALS.—Richard G. Neumann, Wandsbek, near Hamburg, Germany, assignor to the firm of Kakao-Compagnie Theodor Reichardt Gesellschaft mit Beschraenkter Haftung, Wandsbek, near Hamburg, Germany. Filed April 2, 1902.

821,830. METALLURGICAL FURNACE.—Isaiah L. Roberts, New York, N. Y., assignor of one-half to James Turner Morehead, New York, N. Y. Filed May 31, 1904.

821,874. ORE CONCENTRATOR.—John G. Kirksey, Carthage, Mo. Filed April 17, 1905.

821,994. BLAST-FLAME FURNACE.—Byron E. Eldred, Bronxville, N. Y., assignor to Combustion Utilities Company, New York, N. Y., a corporation of New York. Filed April 14, 1905.

821,996. APPARATUS FOR BURNING LIME.—Carleton Ellis, White Plains, N. Y. Filed Jan. 11, 1906.

822,052. MACHINE FOR CRUSHING AND AMALGAMATING METALLIFEROUS ORES.—Hiram Jones, Ascot Vale, Victoria, Australia. Filed May 17, 1904.

822,082. MANUFACTURE OF STEEL.—John W. Spencer, Newcastle-upon-Tyne, England. Filed July 31, 1903.

822,115. METHOD OF DETINNING.—Karl Goldschmidt and Josef Weber, Essen-on-the-Ruhr, Germany, assignors to the firm of Th. Goldschmidt, Essen-on-the-Ruhr, Germany. Filed June 29, 1905.

822,175. PROCESS OF LOCATING AND EXTRACTING METALS BENEATH THE EARTH'S SURFACE.—Edson R. Wolcott, Golden, Colo. Filed Sept. 5, 1905.

Published Week Ended June 5, 1906.

822,241. MINE GATE.—Newton K. Bowman, North Lawrence, Ohio. Filed June 30, 1905.

822,299. PROCESS OF HARDENING COPPER.—Carrie R. Plumer, Seattle, Wash., assignor to Renstrom Tempered Copper Company, Seattle, Wash., a corporation. Filed Aug. 8, 1904.

822,305. PRODUCTION OF STEEL CONTAINING TITANIUM.—Auguste J. Rossi, New York, N. Y., assignor, by direct and mesne assignments, of forty-two and one-half one-hundredths to James MacNaughton, Tahawus, N. Y., and fifteen one-hundredths to Philip C. Peck, New York, N. Y.; Janet MacNaughton, executrix of said Jas. MacNaughton, deceased. Filed May 20, 1902.

822,380. CONTINUOUS INGOT-HEATING FURNACE.—William R. Miller, Pittsburg, and Paul V. Cole, Allegheny, Pa., assignors to The Forter-Miller Engineering Company, Pittsburg, Pa., a corporation of Pennsylvania. Filed July 27, 1905.

822,392. OIL-WELL JACK.—George B. Sessions, Findlay, Ohio, assignor of one-third to Dayton L. Sealy and one-third to Wm. L. David, Findlay, Ohio. Filed Oct. 4, 1905.

822,395. DREDGE CHAIN.—Edw. L. Smith, Breckenridge, Colo., and John M. Sherrerd, Easton, Pa. Filed June 7, 1905.

822,398. APPARATUS FOR TREATMENT OF ORES AND TAILINGS.—August Soderling, Bodie, Cal. Filed July 13, 1905.

822,424. PROCESS FOR FUSING SILICA AND FOR SHAPING THE MASS WHILE PLASTIC.—James F. Bottomley, Wellsend-on-Tyne, and Arthur Paget, North Cray, England. Filed June 9, 1905.

822,515. ORE SEPARATOR.—Fred B. Finley, Los Angeles, Cal. Filed June 26, 1905.

822,547. EXCAVATOR.—George W. Nicolson, Mojave, Cal. Filed May 27, 1905.

822,596. ROCK DRILL.—Arthur H. Gibson, Easton, Pa., assignor to Ingersoll-Rand Company, New York N. Y., a corporation of New Jersey. Filed Dec. 21, 1905.

822,601. TUMBLER FOR BUCKET ELEVATORS.—James H. Gray, San Francisco, Cal. Filed Aug. 10, 1905.

822,671 MINE CAR.—William W. Keefer, Pittsburg, and Charles E. Ward, Banksville, Pa., Filed Nov. 23, 1905.

822,713. METHOD OF UTILIZING AS FUEL THE VOLATILE PORTIONS OF SULPHIDE ORES.—Ralph Baggaley, Pittsburg, Pa., Charles M. Allen, Lo Lo, Mont., and Edward W. Lindquist, Chicago, Ill.; said Allen and Lindquist assignors to said Baggaley. Filed April 3, 1905.

822,753. ORE CLEANER.—Alexander McDougall, Duluth, Minn. Filed April 7, 1905.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy.

Published Week Ended May 26, 1906.

6255 of 1905. SULPHIDE ROASTING.—R. W. E. MacIvor and M. Fradd, London. In the treatment of complex sulphide ores containing nickel, dead-roasting the ores and thereby eliminating the arsenic and antimony. Treating the roast with polysulphide of sodium to convert the oxides into sulphides and thereby forming a matte.

9017 and 9017 A of 1905. FURNACE.—E. Chatillon, Brioude, France. Improved furnace and process for producing various antimony pigments from ores and crude metal.

9239 of 1905. COPPER SULPHATE PROCESS.—H. E. Dolphin, Chester. Improved apparatus for distributing sulphuric acid over copper, for use in the manufacture of sulphate of copper.

9404 of 1905. MANUFACTURE OF CHLORIDES.—E. Haworth and H. Baker, Runcorn. In the manufacture of carbon tetrachloride and sulphur chloride by passing chlorine gas (even though containing large quantities of air or other inert impurities) through carbon bisulphide: passing the residual gases through liquid sulphur dichloride containing antimony chloride, and thus catching the vapors of the tetrachloride, which would be otherwise lost.

11,681 of 1905. HARDENING COPPER.—C. R. Plumer, Seattle, U. S. A. Hardening copper and its alloys by adding to the metal whilst molten, first some powdered sulphate of copper and then powdered bichromate of potash, stirring well, and then, after pouring into molds and partially cooling, sprinkling with sulphur, which combines with any oxide on the surface.

14,571 of 1905. CALCINING.—J. Prosser and D. Upton, Newcastle-on-Tyne. Improvements in calciners for calcining iron ore and limestone for blast furnaces.

16,048 of 1905. ROCK-DRILL ATTACHMENT.—C. Walker and H. B. Player, Sheffield. A mechanical device for attachment to rock drills for changing at any time the percussive motion of the drill into an intermittent rotary motion.

17,886 of 1905. SULPHURIC ACID PROCESS.—The United Alkali Company, Ltd., Liverpool. Improvements in the inventor's process for removng arsenic from sulphuric acid by adding hydrochloric acid and blowing air through, the improvement being intended for catching the arsenical compound thus removed.

18,814 of 1905. TUNGSTEN FILAMENT.—German Wesbach Gaslight Company, Berlin. The manufacture of filaments of metallic tungsten for incandescent electric lamps.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

O. R. Nelson, of Oaxaca, Mexico, is in New York city.

F. A. Heinze has returned from New York to Butte.

V. M. Braschi, Mexico City, is on his way to Europe.

Kirby Thomas, of Denver, Colo., is now in Mexico.

P. N. Moore is in Mexico; he expects to return before July.

W. A. Farish was in Denver, Colo., a few days ago and is in New York at present.

W. B. Low, of Birmingham, Ala., has been visiting New York, on professional business.

A. F. Holden, of Salt Lake City, has returned there from Mexico City and Pachuca.

Arthur Thacher, of St. Louis, has gone to Arizona to examine properties for New York parties.

W. A. Johnson returned to Denver, Colo., from a professional trip to Nicaragua last week.

William Chauvenet, of St. Louis, has gone to the iron district of western Canada for Chicago parties.

Arthur W. Stevens, mining engineer, of Chicago, is at present in Wisconsin examining lead and zinc properties.

W. N. Merriam, of Duluth, Minn., has been making a trip through the Wisconsin zinc region for Eastern parties.

W. B. Potter has returned to St. Louis from a prolonged trip to Mexico, where he went for Mexican capitalists.

Pope Yeatman, of St. Louis, was in Shullsburg, Wis., recently, in the interest of the New Jersey Zinc Company.

James W. Neill, of San Francisco, consulting engineer for the East Butte Copper Company, arrived in Butte on June 4.

A. Chester Beatty, consulting engineer for the Guggenheim Exploration Company, has returned from a trip to Europe.

Richard M. Atwater, mining engineer, of Helena, Mon., has been a visitor to New York. He has now returned to Montana.

H. A. Wheeler, of St. Louis, recently visited Benton and Hazel Green, in the Wisconsin zinc-lead district, for Chicago parties.

Oscar Rohn, manager of the Pittsburg Company's property, has returned to Butte, Mont., from a business trip to Pittsburg.

E. C. Thurston, formerly of San Francisco, has recently returned to New York from a professional trip on the west coast of South America.

H. W. Robbins, of Los Angeles, Cal., has gone to Japan, China, and the Philippines, and will be in the East the remainder of the year.

John Daniell, of Laurium, Mich., sailed Saturday on the "Lucania" for Europe. Mr. Daniell is president of the Wolverine Arizona Copper Mining Company.

Samuel James has resigned as superintendent of Los Arcos Mining and Smelting Company, near Toluca, Mexico, and gone to Colorado Springs, Colorado.

Albert L. Greene has been appointed chemist and assayer for the Luna Lead Company at Deming, N. M. He was recently cyanide chemist for the Rosedale mills.

Walter Mackay, of Portland, Oregon, who mined in the Butte district years ago and later in the Coeur d'Alene country of Idaho, was in Butte on mining business recently.

Prof. Robert H. Richards and Charles E. Locke, of the Massachusetts Institute of Technology, have left with the mining summer school for a visit to the iron and copper mines of Lake Superior.

Herman V. Hesse, for some time past chief engineer of the Fairmont Coal Company, has been appointed general superintendent of the Consolidation Coal Company, with office at Frostburg, Maryland.

Harold C. Sears, of the firm of Bright, Sears & Co., of Boston, and E. C. Frisbee, of Hartford, Conn., both of whom are stockholders in the Raven Company, spent several days in Butte recently.

James Dunsmuir, who has been appointed Lieutenant Governor of British Columbia, is one of the firm which practically controls the output of the Coast and Vancouver coal districts in that province.

H. E. West, late engineer of El Oro Mining and Railway Company, at El Oro, Mexico, has been appointed technical manager of the Bulange mine in the province of Badajoz, Spain. He will take charge in July.

R. M. Atwater, Jr., of Helena, Mont., formerly consulting engineer for the Bald Butte Company, has become consulting engineer for the Cataract Copper Company, operating in Jefferson county, Mont., 30 miles from Butte.

A. M. Yonge, for the past two years superintendent of the Abengarez Goldfields of Costa Rica—owner of the Boston and Tres Amigos mines—is now in Richmond, Va., and intends to remain several months in the United States.

Harry Nestor-Schumann, of Cheltenham, England, has left the Mazapil Copper Company, Mexico, and sails shortly for South America, where he will act as technical adviser to Fraser & Chalmers, having his headquarters at Buenos Aires.

Dr. James Douglas delivered an oration on "Some of the Relations of Railroad Transportation in the United States to Mining and Metallurgy," before the graduating class under the faculty of Applied Science, Columbia University, Tuesday, June 12.

Professors E. L. Kurtz and W. R. Crane, of the School of Mines, Columbia University, have gone to Calumet, Michigan, in charge of the Summer School of Mining, of Columbia University. The instruction will be given in the Wolverine mine.

William Magenau, who has been superintendent of the smelter of the Luna Lead Company, at Deming, N. M., has resigned that position in order to accept the management of the National Rubber Company, which is extracting rubber from the Guayule at Gomez Palacio, Durango, Mexico.

Edwin W. Mills, recently superintendent of the Oriental Consolidated Mining Company at Chemulpo, Korea, has been appointed superintendent of the Chiksan mines, at Chiksan, Korea. These mines are being exploited by the Korean Exploration Company, of Kobe, Japan.

T. P. Bisland has resigned as superintendent of the Hudson Iron Company's iron mine, near Fort Montgomery, N. Y., and is now consulting engineer of the White Silver Company, which is carrying on mining operations at Cobalt, Ont., in the Timiskaming district. Mr. Bisland is succeeded at the Hudson mine by Richard Penhale. Earle C. Bacon, of New York, is consulting engineer.

Obituary.

Samuel Chapin Eaton, who died at his residence in Nyack, N. Y., May 6, aged 76 years, was born in Massachusetts, and educated there and in New York. He served during the war in Gen. E. W. Serrell's engineer regiment, rising to the rank of major. After the war he was engaged in teaching for a time, then practiced as a mining engineer, chiefly in the South Nearly 30 years ago he was appointed to a position in the United States Assay office in New York, and remained there until his death. For a number of years past he had been chief assistant to Dr. H. G. Torrey, the head of the office. He leaves a widow, four sons and three daughters.

A telegram received in the City of Mexico, June 1, announced the death of Harry Simons, a well-known metallurgical chemist. Mr. Simons left Mexico for El Oro nearly three weeks ago, associating himself with the Esperanza Mining Company there, and the news of his sudden death came as a great shock to his many friends in the city. Mr. Simons has been in the Republic of Mexico for 11 years, having been with Adolph Rock, of the Malacate mines; afterward in Oaxaca at the Juanita mines, then in the State of Guerrero, at Campo Morado, with the Re-

forma Mining and Milling Company. Those who were fortunate enough to know Mr. Simons personally will deeply regret the loss of a good friend, whose sincerity and gentle manners won for him the respect of all with whom he came in contact. He was born in the State of New Jersey. The family later settled in Philadelphia where his father was one of the prominent citizens, having been an intimate friend of Stephen Girard, Colonel McClure, and others. Mr. Simons was a graduate of the University of Pennsylvania. Shortly after his graduation the family moved to the West, settling in Salt Lake City, Utah, where his mother and two sisters now reside.

Robert B. Gorsuch, after three months' illness, died June 2, in the Amerian hospital, City of Mexico, of rheumatism and neuralgia, which led to paralysis of the brain. He was buried in the American cemetery Sunday, June 3, the funeral being perhaps the largest attended of any American ever buried in Mexico. Major Gorsuch was born in Brooklyn, N. Y., Sept. 17, 1826. He first studied for the ministry, but after a year took up engineering instead, and much of his work has been for the Government of Mexico, in which country he has been the greater part of the time since April, 1856. He was the first secretary of the American Society of Civil Engineers, in 1852. His first work was as one of the assistant engineers with the Croton Water Works, in New York, and later with the Novelty Iron Works . In 1856, he came to Mexico for the Mosso brothers, who had a concession from Gen. Santa Ana, then president, for the building of a railroad from Vera Cruz to the City of Mexico; but the troubles leading to the presidency of Comonfort prevented the building, and finally a short line was built (the first in Mexico) in 1857 from Mexico City to Guadalupe, which is now part of the Mexican railway. The major was then consulting engineer for President Comonfort on the question of the City of Mexico drainage. He was afterwards appointed special commissioner by Emperor Maximilian to report on a route for a railroad between Vera Cruz and Jalapa, and later by President Juarez to inspect routes for a railroad from Mexico City to Tampico and various other seaports. At the outbreak of the civil war he returned to the States and enlisted as major in the engineering corps of the Confederate army. In 1868, as assistant constructing engineer of the Kansas Pacific, he built the first bridge over the Missouri river at Kansas City. Returning to Mexico he interested C. P. Huntington in the railroad possibilities of that country. This resulted in the building of the Mexican International Railroad between Eagle Pass and Durango, of which Major Gorsuch was chief engineer. He was the representative of the Huntington interests in Mexico for many years. His wife died in Mexico in 1899, and many of his relatives remain in Mexico in prominent positions.

Richard John Seddon, prime minister of New Zealand, died suddenly June 10, on the steamer which was taking him back to New Zealand from Australia, where he had ben to consult with the Government on some important questions. He was born in England in 1841, and went to Australia in 1863. There he succeeded as miner and storekeeper, and a few years later went to New Zealand, where also he found success as a miner and mining engineer. In 1879 he was elected to the legislature, in which he soon became prominent. In 1891 he was made minister of mines, and in 1893 he became premier, an office which he held up to the time of his death. His activity and strong personality made him practically the government. A man of advanced and radical ideas, New Zealand went farther under his leadership in the way of labor laws, graduated taxes and the like, than any other modern community. Mr. Seddon was a self-made man, and the commanding position he attained was due to his own strength and originality. He was an associate member of the American Institute of Mining Engineers.

Societies and Technical Schools.

Technological Society of Kansas City—At the regular meeting in Kansas City, Mo., June 7, M. P. Paret lectured on the Kansas City, Mexico & Orient Railroad, and the mineral resources of the country on the line.

Lake Superior Mining Institute—A circular from the secretary's office at Ishpeming, Mich., announces that the twelfth annual meeting of the Institute will be held in the Copper Country on Wednesday, Thursday and Friday, August 8, 9 and 10. Local committees are now arranging a program for the entertainment of the members and guests. The last meeting held in the Copper Country was in March, 1901, since which time many improvements have been made which will be of much interest to the members. Members are invited to prepare papers for this meeting, and the same should be sent to the secretary as early as possible so they can be distributed before the meeting. Further particulars in reference to transportation, etc., will be announced in another circular as soon as the committee in charge can complete their arrangements.

Pike's Peak Polytechnic Society—At the regular meeting in Colorado Springs, Colo., May 25, Philip Argall delivered a lecture on "The Cyanide Process," treating of the history, modifications and chemistry of the process; its theory and practice; cyanogen liberators; care of solutions; selective actions; precipitation on charcoal, on zinc shavings, and on zinc dust; dry crushing, wet crushing, etc. Mr. Argall is a well-known authority on this subject, and is now consulting engineer for the Gold Cycle Mining Company in the erection of its new mill near Colorado Springs.

Coal Mining Institute of America—The following papers will be read at the summer meeting, to be held in Pittsburg, June 19 and 20 :

President's address, Fred C. Keighley, Uniontown, Penn.; "What Have Our Mining Laws Done for Our State and Country?" Edward Hughes, Phillipsburg, Penn.; "Should the Mining Laws Be Revised, and How?" T. A Douthitt, constructing engineer, York Run, Penn.; "First Aid to the Injured," Dr. Horace G. Painter, Irwin, Penn.; "New Methods of Pumping Compressed Air," A. W. Patterson; "Uses of Compresed Air In Mining," J. L. Dixon.

Papers by Charlton Dixon and others have been promised, titles of which have not yet been supplied by the writers.

Industrial.

The J. George Leyner Engineering Company, of Denver, shipped a complete plant, two stage compressor water Leyner drills and Leyner rock tenier drills to Cork, Ireland, a few days ago.

The Floyd Wells Company, of Royersford, Penn., has placed orders for 100-kw., 230-volt generator and three motors of 35, 25 and 20 h.p. respectively, and two motors of 10 h.p. each, all of 230 volts, from the Crocker-Wheeler Company, of Ampere, N. J.

Application for a charter has been made in Pennsylvania by the Westinghouse Consolidated Foundries Company, of Pittsburg. The object is for the various Westinghouse companies, which now have foundries at Pittsburg, Allegheny City, Cleveland and Attica, N. Y., to have all their castings made in one factory, which is located at Trafford City, near Pittsburg.

The Tanana Electric Company, of Fairbanks, Alaska, has recently concluded the purchase of Allis-Chalmers induction motors as follows: One 10 h.p., type A. N. motor; one 15 h.p., and two 20 h.p. El Palmarito Mining Company has purchased, through its head offices at Philadelphia, one 14x24-in. Reynolds reliance corliss engine, built by the Allis-Chalmers Company.

The general offices of the Mine and Smelter Supply Company have been removed from Denver, Colorado, to 42 Broadway, New York. The officers located at the latter point are, the president, treasurer, secretary, general manager, purchasing agent and traffic manager. The several branch houses remain as follows, at Denver, Colorado; Salt Lake City, Utah; El Paso, Texas; Mexico City, Mexico, and New York.

A decision was, on May 28, rendered in London, England, in the Chancery divi-

sion of the High Court of Justice. The suit was that of the Consolidated Pneumatic Tool Company, Ltd., plaintiff, vs. The Ingersoll-Sergeant Drill Company and another, defendants. The hearing was before Justice Warrington and lasted over a week. The Consolidated Pneumatic Tool Company, Ltd., which is the English branch of the Chicago Pneumatic Tool Company, had brought suit against the Ingersoll-Sergeant Drill Company on alleged infringements of the former's patents on the Roger pneumatic hammer. They sought to enjoin the sale of Haeselor pneumatic hammers in Great Britain. The decision was rendered in favor of the Ingersoll-Sergeant Drill Company.

The General Electric Company which established its main office in the Union Savings Bank Building at Oakland, California, immediately after the San Francisco disaster, as well as a local office on Geary street, has leased a suite of rooms in the new Monadnock building, which it expects to occupy about June 15, 1907. For handling the present business a half a block of land has been leased in Emeryville in close proximity to both the Santa Fe and Southern Pacific Railroad tracks. A temporary building is now about completed on this land for taking care of stock, and work has already been started on a new warehouse, containing about 80,000 sq.ft., which will be located at the south end of the block, bounded by Kansas, Rhode Island, 15th and Alamenda streets. At the temporary warehouse, 40 cars of material have been housed. Additional cars are being shipped from the company's factories so that the stock at San Francisco will soon be complete.

Trade Catalogs.

Receipt is acknowledged of the following trade catalogs and circulars:

Keystone Driller Co., Beaver Falls, Pa. Guide; Pp. 11, illustrated; paper, 7x10 in. 1906.

National Electric Company, Milwaukee, Wis. Bulletin No. 367, illustrated; paper, 7x10 in. February, 1906.

The W. L. McCullough Company, Detroit, Mich. Catalog. The National Ore Pulverizer. Pp. 8, illustrated; paper, 7x9 in.

Towne Manufacturing Company, 9-15 Murray street, New York City. Catalog, Electric Hoists; Pp. 24, illustrated; paper, 6 by 9 in.

George V. Cresson Company, 141 Liberty St., New York City. Catalog, Rope Driving. Pp. 20, illustrated; paper, 7x10 inches.

Paine Metallic Packing Company, 136 Cannon St., Bridgeport, Conn. Pamphlet, The Paine Metallic Packings. Pp. 2; paper, 4x9 in.

Hanna Manufacturing Company, Troy, N. Y. Catalog, High Grade Engineering Instruments; Pp. 70, illustrated; paper, 6 by 8 in. 1906.

Consolidated Engine-Stop Company, 130-134 East 12th Street, New York. The Protection of a Monarch; Pp. 39, illustrated; paper, 6x9 in. 1906.

The W. L. McCullough Company, Ypsilanti, Michigan. Form A., The National Ore Pulverizer; Pp. 14, illustrated; paper, 6x9 in. 1906.

The Wellman-Seaver-Morgan Company, Cleveland, Ohio. Circular No. H-O 8, Self-Contained Geared Hoists; Pp. 31, illustrated; paper, 6x9 in. 1906.

Broderick & Bascom Rope Company, 805-809 North Main street, St. Louis, Missouri. Price List G., Pp. 72, illustrated; paper, 3x9 in. 1906.

H. D. Crippen Manufacturing Company, 25 Broad St., New York City. Catalog No. 10, Box Electric Rock Drills. Pp. 80, illustrated; paper 6x9 in. 1906.

George Anton Bros., factory, Seventh St., Monongahela City, Pa. Catalog, Star, Globe and Eagle Miners' and Drivers' Lamps. Pp. 14, illustrated; paper, 6x7 in.

H. B. Sackett Screen and Chute Company, 4212-4228 State St., Chicago, Ill. Catalog, No. 10, Coal Dealers' Supplies, Special Mining Machinery, etc. Pp. 63, illustrated; 6x9 in.

Dartium Syndicate, Limited, 28, Basinghall street, London, E. C. How to make steel castings and tool steel in the ordinary iron or brass foundry by means of Dartium alloy; Pp. 16, illustrated; paper, 6x9 in. 1906.

Construction News.

Bodie, California—It is proposed to put a mill on the Bodie-Midnight group. E. S. Smith, Bodie, is in charge.

Platteville, Wisconsin—The owners of the Red Jacket mine are preparing plans for a mill, and will soon call for bids.

Nevada City, California—The Murchie Mining Company will add 10 stamps to its mill. J. C. Campbell, Nevada City, is superintendent.

Graniteville, California—The Republic mine is to be equipped with a mill. McLean, Foss & Co., Graniteville, Nevada county, Cal., are owners.

Fort Meade, Florida—A new phosphate tract on Peace river is being opened, and machinery will be needed soon. W. B. Chisolm, Charleston, S. C., has charge.

Goose Creek, Oregon—The Forest City Exploration and Mining Company is arranging to put machinery on its property in the Goose Creek district. J. T. Miller, Baker City, Oregon, in manager.

Canaanville, Ohio—The Canaan Coal Company is at work developing a large coal property, and will erect a steel tipple and put in machinery for a large plant. Lewis V. Brown is general manager; his office for the present is at Jackson, Ohio.

Special Correspondence.

San Francisco June 6.

While the disaster in San Francisco will not permanently retard the mining industry of the State, its effects are for the time being rather depressing. Of course, the stoppage of operations and calling off of projected enterprises is temporary, but for the time being the result is almost as bad as though it would prove permanent. Mine owners have become cautious pending the clearing of the financial situation. In some cases, work has been stopped, and in others forces reduced. Promoters, also, have been compelled to go slow. But this partial stagnation will not last long. In various parts of the State the stage lines and hotels show the effect of the quiet times, few passengers are carried compared with the annual travel at this time of the year, and hotels have little transient business in the mountain towns. Only mining machinery and supplies actually needed are being ordered at the old mines, and few new mining enterprises are being started. The money which usually comes from San Francisco for these purposes is now needed in the city for the rebuilding of the business and residence districts, the buying of stocks of goods and the refurnishing of homes. A large share of the mines on this Coast are owned in full or in part by citizens of San Francisco, and this is the center for mining supplies. Therefore when money is scarce here it is apt to be in the mines of both California and Nevada. The regular producing mines are, of course, all right; but those in course of development or needing equipment will have to wait until the financial situation gets in better shape.

The superintendents of various mines in some of the counties, notably Shasta and Trinity, are complaining of the scarcity of miners. For a certain class of labor there is great demand in San Francisco and numbers of residents of the mountain counties have left for the city to take advantage of this.

At Yerka, the district court has rendered a decision in the Lanky Bob mining suit in favor of George V. Gray, defendant, vs. Charles A. Mitchell and George G. Skillen, plaintiffs. The Lanky Bob mine is in Liberty mining district, Siskiyou county. George G. Skillen was the owner. He bonded the property to Charles A. Mitchell for $10,000, one-half to be paid in 90 days from date of agreement. Before the expiration of the bond, Skillen sold the mine to George V. Gray for $12,000, half being paid down and the balance on time. Then Mitchell commenced suit for possession of the mine, but as he had paid no money down to bind the bargain, the case was decided in favor of Gray, who has taken possession of the mine.

The heavy rains of the last few weeks, while doing damage to hay and grain and some fruits in the country, and bringing

much discomfort to the dwellers in tents in San Francisco and Oakland, have been beneficial generally to the mining sections of the State. An abundant supply of water is flowing in the streams, all useful to the gravel miners and of advantage to the quartz operators. Such late rains in such abundance are very unusual in California.

A contract has been signed between the Northern Electric Railroad and Oroville dredging interests, whereby the former has purchased 1,000,000 cu.ft. of stone. The stone is to be used in ballasting the road bed of the different electric railways that the company is either building now or purposes to build in the future. It is understood that the stone will be taken from the Continental field. The fulfillment of the contract will cause the district to be cleared of the rock piles which the dredgers have left in their property.

At Horseshoe Bend on the Trinity river, in that county, they began last summer the running of a tunnel to drain that portion of the river bed lying between the upper and lower ends of the bend. At that time it was expected that the tunnel would be completed in time to do, at least, some prospecting that season, but this was found impossible and work was suspended, leaving about 150 ft. of the tunnel to be run. Work has now been resumed and the tunnel is being pushed to completion, and it is not impossible that some mining can be done this season. The great drawback to river mining is the shortness of the season in which the water can be controlled. By this tunnel it will be possible to turn the water from the river bed several weeks earlier in the summer and to carry it later in the fall than can be done by either fluming or wing-damming.

One of the first permits for a restraining dam at a hydraulic mine issued in a long time in Sierra county has just been granted by the California Debris Commission to the Allegheny Mining Company. The company owns a large gravel property, which it has hitherto been unable to work to any advantage. The big dam will be built in a cañon where the mountains come close together, and will be high and strong enough to restrain an enormous quantity of debris. On the property the main tunnel is now in a distance of 1600 ft., and 1000 ft. of drifts have been opened. Eastern people are at the head of operations, with W. W. Tiner in charge as superintendent.

A number of experienced hydraulic miners have left Nevada county for the Nome region of Alaska, where they have been engaged to do that kind of mining for a strong company. Good pipe-men for hydraulicking are scarce and secure high pay for their services. The hydraulic mining industry is rapidly increasing in importance in Alaska, many new ditches having been dug to bring in water for this class of work.

The famous old Alaska mine near Pike City, Sierra county, is being re-opened after lying dormant for several years. A new shaft is being sunk some distance from the old works under the supervision of Manager St. John. It is the intention to sink this shaft to 700 ft., while the old one was only down 450 ft. When this point has been reached crosscutting will be begun and an upraise started to tap the old works, on completion of which the mine is to be drained of the immense body of water that has accumulated there since the abandonment. One of the greatest difficulties the old company had to contend with was the water. In the old workings the best pumps obtainable were used and still it was difficult to keep out the water. This will be obviated when the contemplated connections are made.

Goldfield, Nev. June 8.

The latest sensational strike reported is at Alkali Springs, 18 miles northwest of Goldfield, and already there is a rush there. Rich ore specimens from the new camp set prospectors wild. They run high in silver, with a considerable quantity of gold also. The first discoveries were made about two weeks ago, but were suppressed until all the ground in the immediate vicinity was located by the discoverers. Since, however, other finds have been made within a radius of several miles, and it looks as if the district might be from five to seven miles long, and three wide. It lies on a direct line between Silver Peak and Goldfield, and is five miles from the Goldfield & Tonopah Railroad. Already a townsite has been laid out and named Phillipsburg, after G. H. and G. A. Phillips, two of the original discoverers. Every team in Goldfield and all automobiles and conveyances have been utilized to get to the camp, and many have been obliged to walk to the district for want of transportation. Goldfield is greatly excited over the find.

Threatened labor troubles in Goldfield seem to have been prevented entirely by the visit of Governor Sparks. June 6 the miners' union held a meeting which was largely attended. Most of the mines and leases shut down in order to let the miners attend the meeting called to consider the action of officers of the Industrial Workers of the World, who had ordered a strike against the Western Union Telegraph Company, and which strike threatened to involve all the workmen of the camp. As a result of this meeting it is believed that there will be no strike. It is understood that Governor Sparks spoke very plainly to the representatives of organized labor at the meeting. He said that while there was an eight-hour law for mine and mill men in Nevada, there was no eight-hour law for other branches of labor, and that if there was any trouble arising out of demands of other branches of labor for a shorter day and any violence used the State and National government could be depended upon to preserve the peace and uphold the law.

At Bullfrog, present interest centers in the strike of a large vein on the Bullfrog Rush property. It was found in a winze sunk 45 ft. from the tunnel, and crosscuts show it to be over 45 ft. in width, giving fair values in gold.

At Manhattan No. 1 shaft on the Stray Dog is down 150 ft., the vein being 5½ ft. wide at that depth, and showing high average gold values. On the Indian Camp property the shaft is down 65 ft., and ore shipments are being made. A hoisting engine of 24 h.p. has been received, and is at work.

At Rhyolite the Bonanza Mountain Gold Mountain Company reports the discovery of a good vein in the Great Eastern group, which it recently bought.

The grading camp on the main line of Las Vegas & Tonopah Railroad is now within six miles of Rhyolite, and the steel has been laid to a point within 40 miles. A station has been established at Johnnie, 50 miles away, and it will only be a short time until the line is completed into the camp. There is great building activity in Rhyolite at this time, due to the increased population, which the railroad is expected to bring.

It is reported that E. A. Montgomery, Malcolm MacDonald and Donald B. Gillies have closed an option on a valuable tract of mining lands at Emigrant Springs, in the Panamint Range, on the California side of the line, and about 30 miles from Bullfrog. The property comprises 480 acres, and was recently the subject of a sensation as a result of a strike of a promising orebody.

The annual meeting of the stockholders of the Black Hawk Mining Company was held in Searchlight last week at which the following officers were elected: President, Dr. G. M. Shillito, of Pittsburg, Penn.; vice-president and general manager, C. E. L. Gresh, of Searchlight; secretary and treasurer, Chas. R. Moore, of Pittsburg, Penn.; directors, Dr. Mathilt, of Pittsburg, and Robert Dunbar, of Jersey Shore, Penn. The sinking of an artesian well to a depth of 1000 ft. was authorized.

Salt Lake City. June 9.

Shipments have begun again from the Bingham group property at Bingham, which is owned by Boston and Salt Lake parties. The mine is undergoing systematic and vigorous development.

A postoffice has been established in the Gold Butte, Nevada, district, which is located in the southeastern part of Lincoln county, with W. C. Sharpe as postmaster. The office will be known as Gold Butte. This is a new district and recent developments made there indicate that it is a very promising one.

It is anticipated that at the June meet-

ing of the directors of the Utah Consolidated a semi-annual dividend of $3 a share will be posted.

The Bingham Consolidated and Cluster Mining companies have reached an amicable adjustment of the dispute over possession of Bingham mining property. The trouble involved title to ore in the Paradox claim, the Bingham claiming the apex on the Yosemite claim. The latter made a proposition to bear the expense of doing enough development to ascertain whether it is right in its contention which was accepted.

The new mill of the Godiva Mining Company in the Tintic district is giving good satisfaction.

Reports come from Fay, Nevada, to the effect that a great deal of activity is in evidence in that camp and that quite a number of California mining men have become extensively interested there. The Horseshoe mine and mill have been recently sold and will be the scene of a vigorous campaign of development and production.

At a shareholders' meeting the contract made by the board of directors of the Woodside Mining Company, to sell the property of the corporation at Park City to the Silver King Mining Company, has been approved.

The properties of the Ohio Copper Company at Bingham are being examined by A. L. Frank, supposedly in the interests of the Bingham Consolidated.

The Daly Judge Mining Company has begun stoping ore from the big shoot developed on the 1500 level. The company is earning between $45,000 and $50,000 monthly and the management expects to have all of the outstanding bonds called in and the entire indebtedness of the corporation cleared up by July.

Good progress is being made with the raising of steel for the Utah Copper Company's new mill at Garfield.

Butte. June 8.

The capacity of the Boston & Montana smelter in Great Falls is to be increased from 3500 tons to 4700 tons a day, John D. Ryan, managing director of Amalgamated, having made this announcement June 2. Plans for enlarging the plant have been ordered drawn. Improvements at the mines of the company here and the prospects of a greatly increased output of ore in the near future prompted the decision. The company had been figuring on shipping part of its product to the Washoe, because of the inability of the Great Falls plant to handle it, but the former will have all the ore it can take care of as soon as the mines that have been closed down on account of litigation are again in commission. It is still receiving ore from North Butte, Raven, Pittsburg and various other properties. While the Pittsburg was operating its own plant between October, 1905 and April, 1906, it turned out 1,345,657 lb. of copper, which it sold to the Nichols Chemical Company for $339,469, the difference in the amount it should have brought as copper being made up by the gold and silver it contained.

Parrot has opened up a body of ore on the 1800-ft. level of its Parrot mine, a statement to this effect having been made by John D. Ryan at the annual meeting of stockholders held here today. Mr. Ryan said the ore was not high-grade, but its discovery had greatly encouraged the company. At the meeting the old directors were re-elected and a change in the by-laws providing for holding meetings in Boston or elsewhere was made. The board comprises F. Russell, R. D. Willard, Charles D. Burrage and Charles H. Dickey.

Raven is shipping 130 tons of ore a day and has announced an increase to not less than 200 tons soon. It is mining on the 1200 and 1500-ft. levels of the Snoozer mine, through the shaft on the Buffalo, an Amalgamated mine.

Davis-Daly Estate Copper, the Butte unit of the American Consolidated Company, has contracted with W. A. Clark for driving a crosscut 3800 ft. south of the 1800-ft. level of the Original mine. This opening is intended to intersect the veins traversing the ground acquired recently by J. A. Coram for the Davis-Daly Company. Mr. Clark is now operating two stands of converters in his plant and will soon be making his customary quantity of copper per month, 1,800,000 lb. His new smelter building is complete, and his mines are giving it about 900 tons of ore a day.

Reins Copper is still crosscutting for its north and south veins from the 1200, and expects to cut the former hourly. The face is in 135 ft.; that of the south, 65 ft. On the 800 the north vein was only 50 ft. from the shaft but was dipping north. Several of the heavy stockholders from Pittsburg are here to attend the annual meeting and inspect the workings of the property. The meetings will hereafter be held in Pittsburg.

Leadville. June 8.

The sinking of the Mammoth shaft, Big Evans, was continued to the flint, and just to the top of the blue lime, when a heavy flow of water stopped sinking for the time being and the large pumps are being installed within 5 ft. from the bottom of the shaft. When the pumps are in place the opening up of the ore shoot will be commenced in earnest. So far the average value of the orebody is 131 oz. silver and 30 per cent. lead per ton. A drift has been driven into the ore to the southeast for about 20 ft. and it is all in mineral.

The Pawnolas group lying directly west of the Mammoth has been incorporated under the name of the Big Evans Mining Company, with A. V. Bohn as president and general manager, and F. E. Bush, of St. Louis, as treasurer. The property has a record for producing rich iron from close to the surface; this is being worked at present, but the shaft will be sunk another lift of 150 ft. making it close to 600 ft. deep. At this depth it is expected to catch the same character of ore that is being taken from the Mammoth.

With the advent of summer and the drying up of the roads the tonnage for the month of May was close to 79,000 tons of all classes of ore. With the amount of ore that is being hoisted at present the tonnage for the month of June will probably reach 80,000 tons. Quite a number of the mines in the outlying districts are starting up, and those that are at and above timber-line are daily being reached by the owners and will be in operation by the end of the month. The accumulation of ore on these properties from the winter's work is being hauled to the smelters.

Considerable activity is being manifested in the Breece hill section, and in the different properties development in virgin ground is being pushed vigorously with satisfactory results. From the Ibex, Sunday, Highland Chief, Golden Eagle, Big Six, Penn and others a heavy tonnage daily is being sent to the smelters, and the ore consists of iron, silicious and lead carbonates, with some zinc. Sinking still continues on the Silver Nugget shaft, but the manager expects to reach the necessary depth in a few weeks.

When the Mayflower and Sunflower shafts in California gulch were closed down, the body of mineral in both properties dipped rapidly and the owners were bothered with water, so much so that it was advisable for them to stop work. Both properties are again in commission and the shafts are being sunk, and will be sent down a reasonable distance below the dip of the ore. The ore produced in the past was lead carbonate carrying 80 oz. silver and 20 per cent. lead, so with the present price of silver the owners will receive a good price for the ore.

Rock hill has resumed its usual activity and ore is going out steadily from all of the producing properties. A good deal of prospecting is being done at the Reindeer, as well as at the Bessie Wilgus, and the results are satisfactory. At the Rock and Dome the levels to the northeast are being pushed and will shortly connect with the old workings. At present the drifts are in hard lime, but this is believed to be only a roll, so that the contact and ore will be found when this is passed. The lessees on La Plata are shipping good ore.

Denver. June 8.

The American Smelting and Refining Company expects shortly to mine its own coal and manufacture its own coke near Trinidad. Until now the fuel has been purchased from the coal producing companies and the new policy will be a saving in the operating expenses, after having the coal land sufficiently developed, which

may be after one or two years. Sufficient coal land, situated 12 miles from Trinidad, has been purchased for the purpose.

The attorneys for the Colorado Fuel and Iron Company have filed a demurrer in the suit which the Carnegie Steel Company has brought against them in the United States District Court for the use of the Jones method of mixing pig metal in the manufacture of steel, for which patent rights are held by the Carnegie Company.

The United States Grand Jury at Las Vegas, New Mexico, has returned indictments against the Santa Fe Railroad Company for giving rebates to the Colorado Fuel and Iron Company on coal shipped from Starkville, Colo., to Deming, N. M.; while the latter company was also indicted for receiving such rebates.

The committee on mines and mining of the Denver Chamber of Commerce intends to request the Chamber to donate $500 and the State $700, in order to start a preliminary investigation of certain undeveloped mineral districts.

The Portland Gold Mining Company has commenced operations for the construction of the $75,000 cyanide plant, which is to be added to its mill near Colorado Springs, and hopes to have same in operation about October.

A peculiar accident, unprecedented as far as an experience of nearly 30 years is concerned, occurred June 6 at the Radiant coal mines, near Florence, and will, it is hoped, be a warning for the future. Along the roof of a tunnel two electric wires were strung about 7 in. apart, furnishing light in the mine. As one of the miners walked along with a keg loaded with powder on his shoulder, the latter came in contact with both wires, causing a short circuit, when 24 lb. of powder exploded, seriously injuring three men. Fortunately there was a strong air current in the tunnel, the accident happening 1400 ft. from the mouth, so that the smoke did not suffocate them.

The State Supreme Court, by a unanimous vote, has upheld the employers' liability act, which was passed by the Colorado Legislature in 1901, which means that an employer is responsible for the injury or death of an employee, even though caused by negligence on the part of a fellow employee. In the District Court of Teller county, Mrs. Firstbrook had secured a verdict of $5000 against the Vindicator Consolidated Gold Mining Company for the death of her husband, who, while waiting in one of the levels to be taken to the surface in the cage, had fallen down the shaft because of another employee having raised the guard rails. The higher court sustained the verdict.

A movement has been started to erect a suitable monument on the Gregory lode, between Central City and Black Hawk, to mark the first discovery of gold in Colorado on May 6, 1859.

The receipts at the Denver Mint for the first five months of the current year show a slight decrease from 1905. During the month of May a total of $2,470,469 in gold bullion and $4,438 in silver was received, making $10,664,452 gold and $21,474 from Jan. 1 to May 31, 1906. Nearly nine millions in gold were coined during the past month.

Duluth, Minn. June 9.

The Blue Ore Mining Company has sold a tract of land adjoining the Mesabi Chief and St. Paul mines in section 23-56-23, for a royalty of 40c. a ton, and an annual minimum of 100,000 tons to the Chicago Ore Company, mining end of the Central Iron and Steel Company, of Pennsylvania. The mine will not be opened at present, but will await the possibility of a new Mesabi range railway, the construction of which is possible, according to reports. The mine contains, so far as explored, nearly 5,000,000 tons of merchantable ore, running from 55 to 67 per cent., and 1,180,000 tons of it is bessemer.

At the new Mayas mine, on the east end of the range, the importance of small deposits, well located and of good grade, has been once more demonstrated. This property was explored two years ago by a heavy operator, but the tonnage was slight, and it did not appear large enough to bother with. It was again leased a short time ago, and the surface was then stripped for open-cut mining. It was found that the ore could be taken out by dropping it down a chute to cars on the railway track at the base of the shallow deposit, and the mine operation is now going on without the use of steam, either for hoisting, shovelling or pumping, and at the rate of about 23 tons per day per man employed. As the preliminary stripping was light, and uncovered about three tons of ore to each ton of surface removed, the cost of getting this ore on cars is very light, and the profits on the 200,000 or 250,000 tons that may be mined here are large. The ore is of excellent grade and quite desirable in structure.

The New York State Steel Company, a concern which is putting in Talbot open-hearth furnaces at Buffalo, and expects to build blast furnaces, has taken a lease of a 40-acre tract in section 10-58-18, near the Wacouta and Mountain Iron mines, and is exploring the tract. This is its first entry on the Mesabi, and probably any other range, but the company promises to become quite a factor in the iron and steel trade.

Two companies have been organized by Ladenberg, Thalmann & Co., of New York, to operate their mines and develop their mineral lands in the old ranges of Michigan and Wisconsin. They are both of small capital, but have large backing. Considerable exploration will be undertaken soon by the Michigan company under direction of F. A. Vogel. They succeed the Florence-Iron River Company, owned by the same concern. At their Florence mine a large crusher has been installed and will be set to work very soon. It is a large Gates gyratory, and all lumpy ore from the mine will pass through it. This mine will be a larger shipper than in the past, and is being developed into a bigger property than was supposed to be probable.

Calumet, Mich. June 9

One of the most important mining deals which has taken place in the Lake Superior Copper district for some time was consummated this week. The Hancock Consolidated Mining Company has been organized with a capitalization of $5,000,000, divided into 200,000 shares of $25 par value each, to acquire and operate the old Hancock mine and important adjacent properties, adjoining the "old reliable" Quincy. The new corporation has issued only 100,000 shares, at $10 each, and of this number fully three-quarters was taken by the leading interests. The sale of 100,000 shares provides $1,000,000, one-half of which will remain in the treasury for mining operations, and the other half goes to the land owners in payment for the properties.

Interested in the new concern are some of the strongest factors in the copper mining industry in this country. Thomas F. Cole, of Duluth, president of the Oliver Iron Mining Company; John D. Ryan, of Butte, managing director of the Amalgamated Copper Company; Captain James Hoatson, of Calumet, president of the North Butte Mining Company; Charles Briggs, of Calumet, president of the Calumet & Arizona Mining Company, and several wealthy men who are heavily interested with them in North Butte, Calumet & Arizona, Butte Coalition, Bonanza Circle and other copper mines. The St. Mary's Mineral Land Company, of Boston, accepted stock in the Hancock Consolidated in lieu of cash for the greater portion of the mineral lands which it conveys to the new concern. Several other important copper interests in Boston are large stockholders in the Hancock Consolidated.

Included in the acreage of the new corporation is the old Hancock mine, consisting of the southwest quarter of Section 26, in the city of Hancock, minus a 20-acre triangular tract in the southeast corner of the tract, making 140 acres. The new corporation also owns the Condon property, consisting of the south half of the southeast quarter of Section 27 and the northeast quarter of the southeast quarter of Section 27. In addition there are 600 acres secured from the St. Mary's Mineral Land Company, comprising the north half of Section 27, the west half of southwest quarter of Section 27, the northwest quarter of the southeast quarter Section 27, and the southeast quarter of Section 22. This is a total of 860 acres.

Traversing the property are the Hancock lode, the West vein and the Pewabic

lode, all extending to great depth. All three formations carry copper values, and have been thoroughly proven in the Quincy mine, adjoining, to depths reaching one mile on the plane of the formations. From the Pewabic lode the Quincy has taken profits which has enabled it to pay its shareholders dividends exceeding $16,000,000.

It is planned to begin, as soon as possible after the final details of organization have been completed, to unwater the old Hancock shaft, which is opened to a depth of 1000 ft., and enlarge it to the size of a modern shaft, with space for two skip-roads. New hoisting machinery, air compressors, boilers, etc., will be provided, and a modern shaft and rock-house erected to handle the production. After this work has advanced sufficiently, a new shaft will be started. It will be sunk on a vertical line, to the westward and near the boundary between the Hancock and Condon tracts; and crosscuts will be extended at a depth to intercept the various lodes crossing the properties. John D. Cuddihy, of Calumet, has been working out the details of the organization of the Hancock Consolidated for the last few months, and it is due mainly to his efforts that the concern was organized. Mr. Cuddihy is president of the First National Bank of Calumet, one of the strongest financial institutions in the State, and he will be president of the company, and have immediate charge of its business affairs. John L. Harris, of Hancock, who possesses an invaluable knowledge of the Quincy mine, with which he was connected for many years in various capacities, being manager during the latter part of that time, will be superintendent of the Hancock Consolidated's mining operations. He is regarded as one of the best mining men in the lake copper field and is peculiarly fitted for the position he has taken with the new corporation because of his extensive experience in mining the same lodes in the Quincy.

One of the component parts of the Hancock Consolidated, as previously stated, is the old Hancock mine. This property discontinued operations in 1884, when the price of copper went down to a low point. Previous to that time the property was enabled to work satisfactorily. The shaft was sunk to a depth of 1000 ft., and quite extensive openings were created. The operations were confined to the Hancock vein, which was found to average 12 ft. in width, and was uniformly mineralized. Records show that the average yield was 21 lb. of refined copper per ton of rock stamped, which was maintained steadily during the last 18 months of activity. An old Cornish stamp-head was in use at the mill and treated an average of about 225 tons of rock daily.

The Hancock Consolidated Company has $500,000 in the treasury, its property fully paid for, and a shaft down 1000 ft. Only half of the capital stock is issued, leaving stock of the par value of $2,500,000 for future needs.

Scranton. June 11.

A boom is promised the flourishing town of Olyphant, in the Lackawanna valley, by the extensive improvements contemplated by the Delaware & Hudson Company, which have been delayed for more than two years. This week the work of draining the Grassy Island shaft was commenced. The water is being hoisted with a bucket of 1000-gal. capacity, and the gangs are employed day and night. There is now 400 ft. of water in the shaft, and when this is pumped out, the shaft will be sunk a distance of 160 ft. to reach the lower veins. This improvement is to be completed in four months. A large force is engaged in completing the large breaker at the same colliery, and it is expected that it will be ready for operation within 90 days. It will replace the structure destroyed by fire more than two years ago, and will have a capacity of 3000 tons a day. The new washery is also being hurried to completion. The slope on the Miles tract, adjoining, is to be extended 1200 ft. New tracks and other improvements are included in the expense laid out.

As a result of the success which has at attended the stripping operations of the Lehigh Valley Coal Company, east of the Righter colliery, it has been undecided to uncover a large section of the Mammoth vein in Centralia. The stripping, which will extend from Ray's hill to the Logan colliery, will lay bare a large portion of the Mammoth vein which is almost impossible to mine in the ordinary manner.

A new slope is to be driven at the Hazle mines of the Lehigh valley, and a large trestle will be built from the slope to the breaker. The tracks at the breaker are to be lowered to permit of the passing of larger cars.

The old coal drift worked more than 70 years ago by Wiliam Payne, near Pottsville, and known as Payne's Patch, long since abandoned, is to be re-opened.

Madara, Hill & Co., of Hazleton, have acquired a large tract of coal land from the Diamond Coal Land Company, on which they will open a stripping.

The Hazle Mountain Coal Company will drive a tunnel 700 ft. long at its colliery. Bids are invited for the work.

A new lease of life has been granted the anthracite industry in the Hecksherville valley. More than 300 men are employed in construction work at the Pine Knot shaft. A long tunnel is being driven and all the veins will be intersected in this manner, so that all the measures will be worked simultaneously, and the product will be prepared for market by the large breaker which is now ready for operation. About 1½ miles away, at the Thomason drift, a tunnel is being driven to the Buck Mountain vein, which was never worked in this section, although the drift was opened 60 years ago. A railway is also being built from Thomason to the Pine Knot shaft.

The blacksmiths at the Henry Clay colliery of the Philadelphia & Reading have, for some time, been working on a safety device for the mine cages. This was tested on Friday. A mine car was placed on the cage, and while the cage was moving the cable was knocked out of the socket and the cage released. It dropped 4 in. only. It is said that the device will be placed on all the cages of the Reading system.

President Baer, of the Philadelphia & Reading Company, has sustained Superintendent Richards in the order that no mine boss, who obeyed the suspension order, shall be reinstated.

Two hundred slate picker boys and other employees in the Hickory Ridge breaker, of the Susquehanna Coal Company, were thrown into a panic last week, by the structure suddenly settling. When the timber began creaking and twisting many thought that they were about to be swallowed up. They rushed out in alarm, when the ground ceased sinking. It was found that the beaker had subsided 18 in., and went down far enough to pin a string of cars to the chutes of the coal bins, causing a suspension of work. The structure is old and is to be torn down to make room for a new breaker.

The Reliance colliery, Pittston, has been purchased by a new company of Scranton and Wilkes-Barre capitalists, being one of the few collieries not secured by the large companies. The purchase money was $85,000. The property includes a breaker which was built in 1903. It is estimated that there are 4,000,000 tons of coal unmined in the tracts owned by the new company, a new tract, hitherto untouched, having been secured by the new company.

The first strike in the anthracite region, since the new agreement, occurred at the washery of Irish brothers, at Buck Ridge, where the men struck work after making a demand for more wages on the spur of the moment, and being refused.

The first meeting of the Conciliation Board, since the suspension was declared over, was held in Wilkes-Barre this week, when a number of grievances were considered. Most of them were withdrawn or settled. An adjournment of one week was taken. Hereafter, if the complainant or his witnesses shall fail to appear when called, the grievance will be dismissed.

Owing to the acquirement of the Clarence and Avoca collieries by the Erie company, a new district has been created, with E. D. Caryl as superintendent.

Work will be resumed at the Jermyn mines at Rendham, on Monday, after a strike of three months. The trouble was due to a reduction in the price for cutting rock, which the men declared was contrary to the award of the Anthracite Commission. The price was restored.

New York. June 13.

Mining affairs during the past month have shown much activity, and everywhere good accounts are heard. It is true that in California new enterprises are hesitating on account of the capital tied up by the San Francisco disaster; but this condition will not last long.

In Nevada the area of the desert gold mining country continues to be extended by new discoveries. New districts are being added and there is continued excitement and interest.

Elsewhere, gold and silver mining is prospering, without especial incident.

Copper mines everywhere are active. In the Butte district more new companies have been formed, and others still are prospected, until it seems as if there was nothing left to be taken up. The Lake Superior district, also, has seen several new companies organized to work new property and to reopen old mines.

The Lake Superior iron mines are rushing work on a great scale, and preparing to make a record output for the year.

The sensation of the month has been the strike and rioting of the Mexican workmen of the Greene Consolidated Mines at Cananea. The sudden outbreak was promptly repressed by the Mexican authorities, but the district may be uneasy for some time. A Mexican strike is a new feature.

The coal miners and operators have reached settlements in Illinois and Indiana. Only in Ohio and the central districts of Pennsylvania is mining still stopped.

Guanajuato, Mexico. June 7.

The mine of Pinguico is proving to be a veritable bonanza. In the prosecution of developments northward, a new shoot of ore has been cut, which is proving much more extensive and richer than the old one, the vein being more than 3 meters in width in places, and the ore so soft that no powder is used, the entire vein being mined with picks and crowbars. The character of the pay material is a black clay containing fragments of rotten quartz, the pieces occasionally a meter in diameter. Five hundred burros and about 100 mules are engaged in packing the product to the Nayal and Central mills which are running full capacity on the ore from this mine.

Operations have been started on the Cuajin drainage tunnel, hand labor being employed until the arrival of the compressor. This will be placed at the upper end of the tunnel, and worked by an electric motor deriving its power from the central station at Guanajuato.

The city tramway company is at the present time entertaining a proposition from an American company for the purchase of its franchise and rolling stock. If this sale is effected, there is no doubt that the Mexican Central or some other railroad will build into the city, as the franchise of the tramway is the only thing that has stood in the way of this project for some time.

Toronto, Ont. June 9.

With the completion of the smelter now being constructed in Hamilton by the Cobalt Refining Company, which is expected to be ready for operations before the end of the month, the "long felt want" of Cobalt miners of an advantageous means of disposing of their ore will be supplied. It is stated that nearly all the producing mines have arranged for the shipment of their output to Hamilton for treatment. There have been numerous propositions from time to time for the establishment of local smelters, and several companies have been incorporated for that purpose; but with the Hamilton smelter in operation there does not appear to be much opportunity at present for a successful enterprise of that nature. The general view of the mine owners is that smelting can be more economically done at Hamilton than anywhere in the district, as it will cost much less to ship ore to that point, than to bring fuel for smelting to Cobalt. The project of a local smelter to be operated on the process of T. H. Miller, of Detroit, by which it is claimed that a large saving in all the valuable mineral constituents of the ore can be effected, is still being pushed.

London. June 2.

The coal properties belonging to the Souris Coal Mining Company, at Bienfait, in Saskatchewan, 280 miles west of Winnipeg, are being floated in London under the name of the Western Dominion Collieries, Ltd. These mines are not far from the North Dakota boundary and are connected by a short side line with the branch of the Canadian Pacific Railway running from Moose Jaw to Minneapolis. The coal is a brown lignite belonging to the tertiary series, and though it is of no great use for steam raising, it sells readily for household purposes. In spite of its low calorific value, it is used to some extent for firing stationary furnaces, owing to the high price of better qualities. Similar coal is used on the Dakota railways over the border. The mines are well equipped with plant, and labor is plentiful. The present output is 100,000 tons a year, and the resources of the company are estimated at 20,000,000 tons. The total cost of mining, etc., is less than $1 a ton on the cars and the average selling price is $1.55. By the present flotation it is estimated that £20,000 additional working capital will be provided, which will be sufficient to double the output. The issued capital of the new company is £100,000 in ordinary shares and £100,000 in debentures. The London promoters and venders get £74,000 in cash and £99,593 in fully-paid shares, out of which they pay the original vendors—that is, the Souris Campany—£51,000 in cash and £40,000 in fully-paid shares; so somebody on this side gets a good "whack" out of it.

Another interesting American flotation now being arranged in London is the Salinas of Mexico, Ltd., which has been formed to buy up the salt monopoly of Mexico. As your readers are aware, the salt production of Mexico has been in the hands of the Errazu family for 60 years; and for many years their brine wells, the Salinas and Palomas—the former between Zacatecas and San Luis Potosi and the latter north of Torreon in Chihuahua—have supplied the bulk of the Mexican demands, amounting to 40,000 tons a year. During the last few years the production has fallen off and in 1904 the output was only 28,000 tons. The demand is maintained and the difficulty is to fill it. Foreign competition is checked by the heavy import duty and the products of salt works on the coast are not in equal favor with that of the Errazu salt. How to raise capital to bring the salt works up to date has been solved by the Hon. Chandos Stanhope, who will be remembered as chairman of the Exploration Company five or six years ago. With the help of Leonard Clow & Co., a firm of London stockbrokers, he has purchased the properties from Mr. Errazu and floated them as the Salinas of Mexico, Ltd. The capital of this company is £325,000 in ordinary shares and £325,000 in debentures. The purchase price to be paid to Mr. Stanhope as vendor is £126,500 in cash, £110,000 in debentures and £280,000 in ordinary shares. Of this amount £110,000 in cash, £110,000 in debentures and £95,000 in ordinary shares go to Mr. Errazu, the remainder going to promoters, profits and underwriting commissions. The public is being offered £200,000 of debentures for subscription and, as a matter of fact, this is all underwritten; so that, after all purchase money and other expenses are provided for, there will be £54,000 in cash available for improvements and working capital. Monsieur Arnaud, a leading French salt engineer, has examined the properties and considers that the supply of salt will last an indefinite time.

I mentioned recently the financial results of the United Alkali Company and the Salt Union. This week the report for 1905 of Brunner, Mond & Co. has been issued, and the contrast between this company and the other two is as obvious as ever. The net profit for the year was £704,000, the largest on record. The dividend on the ordinary shares remains at 35 per cent., but nearly £200,000 is placed to reserve. There are plenty of people in England who consider Brunner-Mond ordinary an unsafe speculative investment, simply because it pays a high dividend. I suppose these dear people would be quite content and their objections satisfied if Sir John Brunner allowed the London promoters to refloat his company with a capital four times as great, so bringing down the rate to 8 per cent.

General Mining News.

Lake Superior Ore Shipments—Although navigation was practically suspended during the first two weeks of May, the vessels succeeded in moving in May 4,304,954 gross tons of ore as against 4,619,431 tons during 1905, a decrease of 314,477 tons. It was expected that shipments would fall off 500,000 tons during the month. The movement for the season up to June 1 was as follows, in long tons:

Port.	1905.	1906.
Escanaba	956,092	923,744
Marquette	597,978	404,397
Ashland	572,758	632,062
Superior	903,968	868,187
Duluth	1,367,527	1,524,404
Two Harbors	1,416,281	1,399,546
Total	5,814,604	5,752,340

Decreased shipments were shown at Escanaba, Marquette, Superior and Two Harbors; while Ashland and Duluth gained. The total decrease in shipments this year was 62,264 tons, or 1.1 per cent.

ARIZONA.

GILA COUNTY.

Pinal Copper Company—In St. Louis, last week, a petition asking for the appointment of a receiver for the Pinal Copper Company, was filed by Albert R. Campbell, of Pittsburg, and James K. P. Bigger, C. C. Ward and W. B. Nichols, of Cincinnati, stockholders in the company. The Arizona Banner Copper Company is made a co-defendant, as are also Charles A. Lemp, W. A. Kammerer, George B. Teasdale and W. H. Kinsey, all of St. Louis. The company has its main office in St. Louis.

CALIFORNIA.

CALAVERAS COUNTY.

Blue Gravel—For the first time in six months the whistle has blown at this mine and the pumps started by George W. Kimble, of Placerville, who holds a bond on the property. The water was out in a short time and drifting across the channel has commenced. There are 3900 ft. gravel channel embraced under the bond.

Easy Bird—This mine with its 10-stamp mill and four concentrators is shipping 40 tons a month of high-grade sulphurets.

INYO COUNTY.

Big Indian—From this claim near Poleta, owned by H. E. Parker and A. L. Wells, ore of high grade is being mined.

MONO COUNTY.

E. S. Smith has bonded the Bodie, the Midnight, New Standard and Consolidated Pacific mines and will commence work upon them at once; a large mill is contemplated. There are seven claims in the group and the tunnel in one is already being cleaned out, and a hoist is being erected on another.

NEVADA COUNTY.

Banner—While sinking the north shaft between the 600 and 700 levels of this mine, near Nevada City, a 6-ft. ledge of promising quartz has been encountered. The mine has been unwatered and is being reopened.

Union Hill—This mine at Banner has been started up again after a short shutdown. Sixteen men are working for wages, beside a number of tributers. It is expected that a 10-stamp mill will shortly be purchased.

Posey—At this mine, Robt. Richardson superintendent, the tunnel is run in soft ground and it is expected that they will be able to reach the channel in three months.

Union—At this mine, Banner Hill, in the north drift developments are very satisfactory, the vein having increased in size and value as the drift progressed. It is all virgin ground between the 200 and 300 levels. Negotiations are pending for the purchase of a 10-stamp mill from another mine.

Cyanide Plant—The heavy rains recently sent a torrent with a 12-ft. crest down Wolf creek and completely destroyed the nearly completed cyanide plant of Penhall & Bree, 14 miles from Grass Valley.

Ocean Star—This mine on the Yuba river above the town of Washington has been bonded by M. D. Cooley to Albert Maltman and M. C. Emerson, who will organize a company to develop it.

Gaston Mining Company—A tunnel which will take between two and three years to complete has been started at this property. It starts from Poorman's creek and will be about 4000 ft. long, tapping the ledge at a depth of 3000 ft. About 100 men continue to work in the mine.

PLACER COUNTY.

Forest Divide—The Jarvis mine at Red Point, employing 40 men has closed down, and the Dardanelles has also, but the Buckeye continues to pay. Work will shortly commence again on the air-shafts of the Hidden Treasure Company. The shut-downs are due to the disaster at San Francisco.

PLUMAS COUNTY.

Walker Brothers, of Salt Lake, are preparing to start work on a copper property two miles south of the Five Bears mine in Genessee Valley, and will put in a compressor and employ 50 men in development work.

Genesee Copper Company—This company at Genesee, which suspended work at the time of the San Francisco disaster, is preparing to resume and will drive a deep tunnel under Copper mountain to cut the Genesee copper belt.

Uncle Sam Group—Cotton & Shipes, owners of this group near Genesee, have uncovered an 18-ft. ledge of yellow sulphide.

SAN DIEGO COUNTY.

Hofman Jewelry Company—This company of Columbus, Ohio, has secured a controlling interest in the Pala gem industries by purchase of shares in the Tourmaline King, Tourmaline Queen, Homestake and other claims. This purchase is expected to give quite a boom to the gem mining industry at Pala.

SHASTA COUNTY.

Washington—At this mine, French Gulch, the tunnel which is to be 580 feet long to strike the ledge is now in 250 feet.

Mountain Monarch—In this mine, near Stella, a 4-ft. ledge prospecting mill was recently struck. A wagon road has been completed to the mill site.

Brunswick Group—This group, near French Gulch, has been bonded by Frank Rossi to D. M. Palmer and others. This was formerly known as the Bodie and Ophir group and there are several veins in it.

American—Good ore has been struck in this mine at French Gulch, which is considered of great importance in that section. The mine was formerly a great producer on the surface, and the new strike is at some depth. The mine adjoins the Gladstone on the west. At the end of the 1240-ft. tunnel a 5-ft. ledge was encountered, which will mill $30 per ton.

COLORADO.

SUMMIT COUNTY.

Old Union—This mine has made a rich strike in the bottom level workings; the breast of the main tunnel now shows up 4 ft. of zinc ore of shipping grade. Besides this is a body of concentrating ore which is being milled. The 150-ton mill is now running full time and producing high-grade lead and zinc concentrates. It now has ten Wilfley tables in the plant.

Wellington—This mine is producing large and regular shipments of lead and zinc ores.

Country Boy—In this mine leasers have the finest body of zinc ore in the district, and are shipping large quantities of black sulphides which run 50 per cent. and over in carload lots just as taken from the ledge. They are also piling up a large tonnage of low-grade to be treated at the mill, which will be put into order very shortly.

Atlantic—This mine, on North Star mountain, is increasing its force of men, and will resume its shipments in the course of a week. The roads have been too bad of late for hauling, and in consequence a large supply of ore is on hand awaiting shipment. The ledge producing this ore is from 15 to 20 ft. wide and is over 10 ft. high at the breast of the main drift. It averages from 3 to 5 oz. in gold to the ton.

Jessie—This mine now has its 40-stamp mill running, and as the ore in the bins is of exceptionally high-grade, a good clean-up is expected. A strike of high-grade ore was recently made in this property.

Mekka—H. W. Spalding has been appointed superintendent of the Mekka Placer Gold Mining Company operating in French Gulch. Hydraulicking work is now in full swing, and the rich ground of the old Oro Company will soon be washed.

Wire Patch—J. C. Putner, of Denver, is in charge of the renewed operations on the famous Wire Patch mine on Farncomb hill. He has a force of men on opening up the orebodies, and some mechanics at work putting the mill into working order for immediate production.

Sallie Barber—This mine, on Nigger hill, has been working on a high-grade zinc ledge for some months past, and has been producing large shipments. This body has now opened up to 9 ft. of solid zinc sulphide, all of which is shipping ore.

Abundance Mining and Milling Company—This company has started the diamond drill in operation in Yuba Dam flats. They begin at a depth of 120 ft., at which point the churn drill stopped working on account of the solid rock being encountered. In the operation of the churn drill a body over 40 ft. of low-grade ore was passed through.

FLORIDA.

POLK COUNTY.

A tract of land on Peace river, near Fort Meade, has been sold to W. B. Chisolm and associates, of Charleston, S. C. They are making arrangements to begin mining phosphate.

KENTUCKY.

OHIO COUNTY.

Green River Coal Company—This company is preparing to begin active operations on the property which it has recently acquired on Green river, near Taylortown. The headquarters of the company are at Parkersburg, W. Va., and it is preparing to work on a large scale.

MICHIGAN.

Until recently the Michigan corporation law limited the capital stock of minnig companies to $2,500,000, or 100,000 shares of a par value of $25 each. The last legislature passed an act raising the limit authorized to $10,000,000 or 400,000 shares of $25 each. The minimum capital, or the smallest amount on which a company can be organized, is $10,000. Under the amended law, also, companies are enabled to purchase stock in other companies formed for the purpose of constructing canals or harbors and railroads, when facilitating methods of transportation to and from mines; and also to purchase or acquire stock in new companies formed for mining or smelting purposes. The Calumet & Hecla has already taken advantage of the latter clause by investing in the new companies now developing land in Keweenaw county. The Quincy will be the first company to avail itself of the authorization of larger capital, having given notice of an increase from $2,500,000 to $5,000,000 or 400,000 shares.

HOUGHTON COUNTY—COPPER.

Isle Royale—Diamond drill work has started on the Isle Royale amygdaloid lode between Section 2 and the southern workings of the old Huron mine. Drifting in that direction from the new shaft reveals good ground, and if the conditions continue as promising, a new shaft for permanent service may be started there.

Tamarack—Some work is being done in No. 5 shaft, but the water which accumulated during the period of idleness caused by the fire, is still a hindrance. It is expected No. 5 will start shipping rock in another week, and Nos. 1 and 2 should be in commission before the end of the month.

ONTONAGON COUNTY-COPPER.

Lake Copper Company—Sinking in the shaft has passed the fourth level, 400 ft. deep, and is penetrating good copper ground. The lode has been well mineralized through the last 50 ft. and showed mass and barrel copper, besides a good grade of stamp rock. Diamond drill work has reached a depth of 1000 ft. in the first hole. Preparations are being made to start a second hole.

Nonesuch—Preparations for exploratory work at this property, which is now in the hands of the Calumet & Hecla Mining Company, are progressing rapidly. Considerable machinery has been delivered at Ontonagon and will be teamed to the mine, which is in the Porcupine Mountain copper range. Charles S. Smith of Oconto, Wis., has arrived to take charge of the work. Cole & McDonald, of Duluth, Minn., have the contract for the diamond drill work, and part of their outfit is on the ground. Two drills will be used. Some of the old shafts will be cleaned out, and if the outlook is encouraging, the openings may be extended. Some of the old buildings have been repaired to house the working force.

Victoria—Work of equipping the new stamp mill is completed in all essential parts, and simply the adjustment of some of the machinery remains. One head is installed, with room for another, and the plant will treat 300 tons of rock daily as now constituted.

BARAGA COUNTY—IRON.

Harry Northey, of Houghton, has purchased a parcel of land near Baraga from Col. William Couch, with the intention of developing the iron-ore deposit which lies near the surface. He expects to begin work shortly.

MONTANA.

CARBON COUNTY.

Rocky Fork Mine—At this mine, near Red Lodge, on June 8, a fire started in one of the inclines, in some way not explained. Eight miners were suffocated, two of them being members of a rescue party which entered the mine to save those who were already there.

FERGUS COUNTY.

Barnes King—As heretofore reported, this gold property at Kendall has been bonded by men who are interested in the Amalgamated properties. The bond is for $1,500,000 and the deal is to be completed in September. The properties were examined for the prospective purchasers by W. R. Word. There are about 20 claims in the group, carrying deposits of medium grade cyaniding gold ore, with a 220-ton mill and cyanide plant. The gross output is $40,000 per month. The ore is easily and cheaply mined from two open pits and through a shaft 300 ft. deep.

LEWIS & CLARKE COUNTY.

Jay Gould—At this mine 90 men are employed this season, and the mill is running steadily.

Whitlatch—At this mine development work is now well ahead of the stoping. The mill is in steady operation.

Piegan Mining Company—This company recently acquired, in addition to the Piegan properties, the Gloster mines. There are four tunnels on the Piegan ground, and a 60-stamp mill, and the total development on all the consolidated properties is about 10,000 ft. New orebodies have recently been encountered and in the Piegan 35,000 tons of ore are blocked out.

Bald Mountain—Larson & Constance are building a 100-ton cyanide plant to work the Larson tailings from the Bald Butte mine. Woolman & Edwards are building a 150-ton cyanide plant to work the Bald Mountain tailings. Both these are in the Marysville district.

MADISON COUNTY.

Hinch Creek—A group of claims on Hinch creek, above Laurin, has been sold by George Brown to Butte parties. The claims make a good showing in copper.

Conroy Placer Company—This company's dredges in Madison cañon, near Ruby, are to be operated by electric power. The Madison River Power Company is now putting up the transmission line.

Alameda—Pañkey & Gordon, who operate this mine under lease, have put in an air compressor.

Cook—At this mine, in Williams' gulch, new machinery is being put in.

Stella—This mine, in Hell cañon, is now owned by B. Yarbough, of Stella. A narrow vein of high-grade ore was recently struck.

Revenue-Monitor—This mine, near

Virginia City, is hereafter to be operated by leasers. E. Williams will have general charge.

MISSOULA COUNTY.

Iron Mountain—Work on this mine is being pushed and several hundred feet of the 6000-ft. tunnel are completed. This tunnel will tap the ore bodies at a depth of 1750 ft. and will drain the mine as well as give an outlet for the ore mined.

SILVER BOW COUNTY.

United Copper Company—At the annual meeting, last week, Charles R. Leonard and S. E. Nash were succeeded on the board of directors by John M'Ginnis, of Butte, Mont., and Samuel Robinson of New York. The following-named directors were re-elected: F. Augustus Heinze, Arthur P. Heinze, Otto C. Heinze, Stanley Gifford, Max H. Schultze, H. G. Abel and G. Reusens.

NORTH CAROLINA.

ROWAN COUNTY.

Union Copper Mines—The production of this mine was stated at too high a figure in our issue of June 2, when it was given at 100 tons a day. We are informed that the ore shipments for the past year have been from 1000 to 1200 tons a month. The production could be increased, but lack of men and difficulty in getting cars have kept it down.

OREGON.

BAKER COUNTY.

The Pocahontas and Rock Creek mining camps are just now attracting much attention. Articles of incorporation have been filed by the Mattoon Gold Mining Company in Baker county. The president of this company is Gen. Horace S. Clark, of Mattoon, Ill.; H. W. Clark, vice-president; W. M. Lytle, secretary; J. A. Montague, treasurer, of all Mattoon. The manager and resident director in Baker City is A. W. Butler. The company owns eight claims in McCord gulch in the Pocahontas mining district about seven miles directly west of Baker City, lying in the foothills of the Baisley-Elkhorn range. This property has been developed by tunnels and by a shaft, which is now down 200 ft. and on which the work is now concentrated. The ore so far found is free-milling, with fair values in gold.

PENNSYLVANIA.

BITUMINOUS COAL.

Wharton Coal and Coke Company—Fire at this company's plant at Coral in Indiana county, on June 5, destroyed the tipple, coal washer and crusher. The engine-house and electric plant were saved.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Spearfish Smelter—Mr. Maass, the industrial commissioner of the Burlington road, has been inspecting the Hills with a view to reporting on the advisability of building a spur from Spearfish to the Wyoming coalfields. It is understoood that he will report favorably, in which case the smelter proposition for Spearfish will be assured.

Homestake South Extension—The drifts run from the 165-ft. level to cut off the water have reached the distances of 40 ft. east, and 35 ft. west. Drifting will be continued another month, and then sinking will be resumed.

PENNINGTON COUNTY.

Deer Creek.—A strike of copper ore has been made on this creek two miles southeast of the Yellow Jacket property. The vein, which is wide, yields copper, gold and silver. There is a proposition to build an electric plant on Rapid creek near the mouth of Deer to furnish power for an electric road to connect this mining district with the railroad.

Mariposa—Superintendent John Wise is driving a tunnel to tap the main vein at a depth of 500 ft. An air compressor has just been installed with other machinery. The management of the company intends to expend a large amount of money on development work before attempting the erection of a mill.

Egyptian—This property, lying near the Holy Terror and Keystone, is reported sold. It is believed that this is the first step taken by those who intend to consolidate the Egyptian claims with the Holy Terror-Keystone. The option on the Egyptian was held by Utah men who, in this event will consolidate with an Eastern syndicate for which Mr. Collins, of Boston, has been acting.

UTAH.

BEAVER COUNTY.

Black Rock Copper—A contract has been let to drive a drift to the contact vein from the 200-level of the shaft.

BOX ELDER COUNTY.

Utah & Idaho—This corporation has been developing the old La Plata mine district and has encountered a well defined ledge after doing about 3000 ft. of development work during a period of several years. La Plata district was discovered in 1891, when some immense boulders of galena lead ore were found, besides quite large surface deposits of lead carbonates.

Century—This Park Valley property is still under development.

JUAB COUNTY.

Tintic Ore Shipments—Last week these amounted to 163 car loads, the shippers being: Gemini, 17; Eureka Hill, 21; Yankee Con., 4; Eagle & Blue Bell, 9; Bullion Beck, 11; Victor Con., 4; Grand Central, 4; Ajax, 2; Swansea, 4; Joe Bowers, 1; Centennial Eureka, 35; Uncle Sam, 10; Beck Tunnel, 6; May Day, 5; Black Jack, 4; Carisa, 6; Mammoth, 7; Dragon Iron, 11; Scranton, 2; Godiva, (concentrate) 2 cars.

General Farragut—A strike of lead-silver ore has been made in this property, which is located in the North Tintic district. Developments in this section of late have been important and proves, that the mineralized area of Tintic is larger than some had supposed.

SUMMIT COUNTY.

Naildriver—It is stated that this property will resume development work again soon.

Ontario—Ore extraction is going on from the upper levels and the work undertaken to reopen the drain tunnel, which has been closed by a series of caves for more than a year, is progressing.

VIRGINIA.

According to the Baltimore *Manufacturer's Record,* the Clinchfield Coal Corporation, recently organized, has purchased all coal properties of the Crane's Nest Coal and Coke Company, the Dawson Coal and Coke Company and the Clinchfield Coal Company in Wise, Dickinson, Russell, Buchanan and Scott counties in Virginia. The Clinchfield Corporation will proceed to make large developments preparatory to shipment over the line of the South & Western Railway when it is completed. Large operations are at present being conducted at Toms Creek, in Wise county, and at Dante, in Russell county. Officers of the Clinchfield Coal Corporation are C. C. Chapin, president, and T. W. Wortham, vice-president, both of Richmond, Va., and J. Norment Powell, of Bristol, Va., secretary-treasurer.

Foreign Mining News.

CANADA.

BRITISH COLUMBIA.

Granby Consolidated—Two new vice-presidents were elected at the regular monthly meeting of this company's directors, George Martin Luther and George C. Clark, Jr. Jay P. Graves heretofore has been the only vice-president.

MEXICO.

LOWER CALIFORNIA.

The Supreme Court of Mexico has settled the litigation which has been in progress over six years for the control of the San Fernando group of mines in Lower California. The settlement is in favor of J. E. Brophy, of Bisbee, Arizona. Mr. Mitchell, a Colorado mining man, has been appointed manager. The smelter at Cedros Island will be removed to the mainland and reduction works established. The mines are 90 miles south of San Quentin.

SINALOA.

United States Consul Louis Kaiser sends from Mazatlan the report that contracts have been signed between the governor of that Mexican State, on the one

hand, and President Randolph, of the Sonora & Guadalajara Railroad, and Engineer McKay, on the other, for the construction, at Mazatlan, of a smelter to cost over half a million dollars.

AFRICA.

TRANSVAAL.

The gold production for May is reported at 461,202 oz., the highest monthly output on record, and an increase of 44,807 oz. over May, 1905. For the five months ending May 31, the total production was 2,180,492 oz. fine gold, or $45,070,770; which compares with 1,948,453 oz. in the corresponding period of 1905. The increase this year is 232,039 oz., or 11.9 per cent.

JAPAN.

FORMOSA.

Since the island of Formosa became a Japanese possession, gold mining has been conducted with some regularity. There are now three mines in operation; the Kyufun operated by the Fujioka Mining Company; the Kinkwaseki, by C. Tanaka, and the Botanko, by K. Kimera. In addition, there are several placer workings. A recent report gives the output for two years past as follows, in bullion ounces:

	1904.	1905.	Changes.
Kyufun	21,360	25,800	I. 4,440
Kinkwaseki	14,341	24,800	I. 10,459
Botanko	12,641	12,130	D. 511
Placers	5,126	3,447	D. 1,679
Total	53,468	66,177	I. 12,709

The bullion reported in 1905 was equal to 50,197 oz. fine gold, or $1,035,768. The increase over 1904 was 23.8 per cent.

Coal Trade Review.

NEW YORK, June 13.

In the Western coal trade Indiana has followed the example of Illinois in a settlement on the basis of the 1903 scale. The particulars are given in the Indianapolis letter following.

Ohio remains a storm center, and most operators are waiting the result of the attempts to work with non-union miners. Although comparative quiet has been restored in the disturbed district by the presence of State troops, further outbreaks are feared. The conference of miners and operators at Columbus failed to reach any agreement and adjourned.

The figures given elsewhere show a decrease in anthracite shipments this year of 21 per cent. up to the end of May. No scarcity has been evident in the markets, however; and it is probable that the suspension of six weeks in April and May has been really of some advantage to the companies, enabling them to work off the surplus which had accumulated as the result of the mild winter.

COAL TRAFFIC NOTES.

The total coal and coke traffic originating on all lines of the Pennsylvania Railroad east of Pittsburg and Erie for the year to June 2, was as follows, in short tons:

	1905.	1906.	Changes.
Anthracite	1,942,262	1,686,117	D. 256,145
Bituminous	11,618,676	13,308,987	I. 1,690,311
Coke	4,648,200	5,370,805	I. 722,605
Total	18,209,138	20,365,909	I. 2,106,771

Shipments of Broad Top coal over the Huntington & Broad Top Railroad for the week ending June 9 were 11,304 tons; for the year to June 9 they were 347,054 tons.

The total anthracite shipments reported in May were 3,254,430 long tons, which compares with 6,005,158 tons in May, 1905. The Lackawanna was the heaviest shipper last month. For the five months ending May 31 the shipments were as follows:

	1905. Tons.	1905. Per Ct.	1906. Tons.	1906. Per Ct.
Reading	5,025,941	20.2	3,959,852	20.1
Lehigh Vy	4,050,891	16.3	2,786,002	14.2
N. J. Central	3,221,137	13.0	2,461,284	12.5
Lackawanna	3,861,059	15.5	3,373,419	17.2
Del. & Hudson	2,402,432	9.7	2,039,950	10.4
Pennsylvania	2,047,006	8.2	1,725,723	8.8
Erie	2,440,638	9.8	1,966,082	10.0
N. Y., Ont. & W.	1,175,801	4.7	854,656	4.3
Del., Sus. & Schu'l	648,040	2.6	491,716	2.5
Total	24,872,945	100.0	19,658,684	100.0

The decrease this year—5,214,261 tons, or 21 per cent.—was, of course, due to the stoppage in April and part of May. The shipments this year, by months, have been: January, 5,458,048 tons; February, 4,712,099; March, 5,745,868; April, 488,439; May, 3,254,230; total, five months, 19,658,684 tons.

The Chesapeake & Ohio Railway reports coal and coke tonnage over the line as below, for the 10 months of its fiscal year from July 1 to April 30, in short tons:

	Coal.	Coke.	Total.
New River	4,657,133	272,146	4,929,279
Kanawha	2,476,337	92,928	2,569,265
Kentucky	91,704	.....	91,704
Connecting lines	370,099	43,569	413,668
Total	7,595,273	408,643	8,003,916

The totals show an increase of 1,138,533 tons of coal and 149,516 tons of coke. The distribution of the traffic originating on the line was: Points west of mines, 3,047,209 tons coal and 214,524 tons coke; points east, 1,326,395 tons coal and 150,550 tons coke; tidewater, 2,851,570 tons coal.

New York. June 13.

ANTHRACITE.

The hard-coal market is exceedingly quiet and yet it is marked by a certain amount of irregularity. Full production has not yet been resumed and probably will not be for a number of months, since coal of nearly every description is in abundant supply. Certain sizes of coal are scarce, however, particularly stove; buckwheat is to be had in abundance, but pea is somewhat shorter.

Prices on the domestic sizes remain throughout June at the following prices: $4.45 for broken and $4.70 for domestic sizes. For steam sizes; $3 for pea; $2.25 @2.50 for buckwheat; $1.45@1.50 for rice and $1.30@1.35 for barley f.o.b. New York harbor shipping points.

BITUMINOUS.

The Atlantic seaboard soft-coal trade shows no change from its quiet condition. All consumers are trying to work off the stocks of coal that they accumulated early in the year. For this reason it is difficult to get orders for present delivery, and the same condition affects even consumers on contract, who appear unwilling to accept coal according to their monthly allotments. The labor difficulty in central Pennsylvania has settled down to a trial of endurance; the present market conditions offer no inducement to producers to raise the cost of mining.

Trade in the far East is excedingly quiet and nobody is taking on coal even with the inducements offered by low ocean freight rates. The Sound is also quiet, so much so that water transportation companies are tying up some of their facilities. New York harbor trade is dull, but producers are not bringing forward more coal than they can handle promptly, for which reason stocks are small and arrivals are soon disposed of. Prices range around $2.50@2.75 f.o.b. New York harbor shipping points for good grades.

All-rail trade is slightly more active than tide-water; consumers are taking on coal in somewhat larger amounts proportionately, although not actively. Transportation is fairly good and car supply is well up to the small demand.

Vessels in the coastwise market are in slight demand and rates continue at about the same figures reported last week.

Birmingham. June 11.

Coal production shows some improvement in this State and there is a demand for every ton that is being mined. Considerable foreign labor has been brought into the district lately and agents are working in New Orleans for more. The Tennessee-Republic Company is especially anxious to get more men and is making preparations to receive a large number of men through the port of New Orleans.

The annual convention of the United Mine Workers of America, convened here today. After the convention organized President Edward Flynn submitted his annual report. He touched at length on the strike which began in July, 1904. He told of the heavy expense the strike has been to the organization and congratulated the men on their steadfastness to the union. He said that there was some hope in the fact that a change in management had taken place in the larger corporations in the district. The report of the secretary-treasurer, J. L. Clemo, showed that the expenses of the district for the year to April 30, all practically going for the strike, amounting to $499,030. A balance of $30,802 is accounted for, of which $8836 is under deposit as bonds for members of the union who were arrested on various charges since the strike began. Four thousand men are reported

as being on strike with more than 8000 at work in the district. A joint conference has been set for next Monday when it is intended to adopt a wage scale. The expectations are that there will be a renewal of the contract which has been in effect now for three years, being the result of an arbitration held here, with Judge Gray as the presiding officer.

The Tennessee Coal, Iron and Railroad Company will shortly begin sinking a new shaft in the Pratt Mines division. The company has considerable development under consideration, part of it now being carried out.

Coke is plentiful again in this district. Good prices still obtain for this product, however.

Cleveland. June 11.

Lake movements of coal are reported just fair. The situation in the coalfields is practically unchanged. In a few of the districts the owners are trying to operate their mines with non-union labor, and are meeting with varying success. It is also reported that a few of the union miners have gone back to work, but with it all the production is very light, and for that reason the supply at hand for shipment up the lakes is limited.

Few contracts are being made with vessel-owners. The mine-owners are not yet in a position to forecast the outcome of the strike, and for that reason the future cost of production is involved in considerable uncertainty, making shipping contracts inadvisable. A few are being negotiated at the old rate of 40c. to Lake Michigan and 30c. to the head of the lakes. Wild boats are not popular. The demand from upper lake points is quite active.

The local demand is rather light, as most buyers are still burning up their old stock-piles. Domestic prices are practically steady on the basis of $1@1.10 at the mines for run-of-mine coal and 75@80c. for slack at the mines. The boats are still using lake three-quarters, for which they are paying $2.60 f.o.b. boats.

The coke market continues strong. Light supply and active inquiry are reported. Both furnace and 72-hour foundry coke are selling at $3 per ton at the oven.

Indianapolis. June 11.

The strike in the Indiana coal field ended officially June 8, when the joint convention of the Indiana bituminous operators and the Eleventh District of the United Mine Workers's voted unanimously to accept and adopt the report of the joint scale committee. The new contract ratified is a lengthy one, and is believed to be a great improvement on the patchwork affairs of the last five years, because it will be less open to dispute over the meaning. The new contract contains a special provision, with penalties, against stampede strikes on the part of miners, or disregard of arbitration on the part of the operators. The terms of the contract are very clearly stated. The scale of 1903, or 90c. a ton for pick mining, is restored. This had been reduced to 85c. by the 1904-5 contract. The price for run-of-mine under the new contract is 55c. The scale of 1903, contended for by the miners, is thus granted, but the operators are gratified over gains made in their favor; thus both sides claim a victory.

Perhaps for the first time in the history of a wage contract for any class of labor, fines are provided for employee and employer for causing idleness without first trying to settle a grievance by arbitration. This is one thing for which the operators have been contending. The stampede strike has cost the owners of mines much in money and time—in money because the men suddenly quit work when the operator had fixed charges to meet, and in time trying to get the men back to work.

The old contract had a provision for arbitration, and that work should not be suspended pending arbitration, but stampede strikes were frequent and the operator was without recourse. Now the miners of a local, when such strike takes place, are to be fined $1 a day for each member, agitator and conservative alike. On the other hand the operator is to be fined $50 a day for like disregard of the arbitration clause and the money from fines is to be divided equally between the United Mine Workers' organization of the field and the Operators' Association.

Another new provision is against the stopping of work for funerals. A mine may not be thrown into idleness because of death or funeral, except that the men may discontinue work for the remainder of the day in case of a fatal accident. There is established a death benefit of $50 for a man, $50 for an employee's wife and $35 for any member of the family over 14, the company to pay one-half and the local union one-half.

Both miners and operators are pleased with the new contracts, but it is an interesting question to know how the new agreement will affect the operators who did not "stand pat," and who signed the scale of 1903 unconditionally. About 10 per cent. of the output of Indiana was represented in such agreements and about 2000 men were affected. If these "scab" operators desire to get back into the association they will have to make amends of some sort before the "standpatters" will assist them to get the benefit of the new contract.

Now that the strike or suspension is ended and two months' time and a large amount of money lost, mining in Indiana will be at full blast in a few days. The mines were never in better condition and the accustomed amount of coal will, it is thought, be mined this year.

The Retail Coal Dealers' Association of Indiana and Michigan held its annual meeting in Fort Wayne during the past week. The matter of freight rates, demurrage charges, short weight and railroad discriminations were all discussed and action taken. The association has 346 members, and is in a good financial condition. Officers were elected as follows: President, F. A. Hobbs, Benlon Harbor; vice-president, A. B. Myers, Indianapolis; A. E. Harris, Fort Wayne, secretary, and A. E. Bradshaw, Indianapolis, treasurer.

Pittsburg. June 12.

Coal—The rivers were navigable the last two days of the week but a coal boat stage was not reached. Nearly all the coal loaded in barges was shipped, amounting to between 8,000,000 and 9,000,000 bushels. The bulk of this was sent out by the Monongahela River Consolidated Coal and Coke Company, two independent interests making heavy shipments also. Barges contain from 12,000 to 13,000 bu. and are sent to the Cincinnati and Louisville markets, while coal boats holding 25,000 bu. go to New Orleans and Mississippi river points. A lot of empty craft came up on the rise and the river mines will be kept in steady operation. All the railroad mines are running satisfactorily, the supply of cars being very good. Prices remain about the same, quotations being $1.10@1.15 a ton at the mine for mine-run coal.

Connellsville Coke—There was but little change in production and shipment and prices remain at $2.35@2.50 for furnace and $2.65@2.80 for foundry. The *Courier* gives the production in the Connellsville region at 271,594 tons and the shipments 14,756 cars, distributed as follows: To Pittsburg, 4838 cars; to points west of Pittsburg, 8003 cars; to points east of Connellsville, 1905 cars. In the lower Connellsville region the production for the week amounted to 102,910 tons.

Foreign Coal Trade.

June 13.

Imports and exports of coal in Belgium for the four months ending April 30 were, in metric tons:

	1905.	1906.	Changes.
Imports	1,300,405	1,711,968	I. 411,563
Exports	1,485,845	1,656,535	I. 170,690

In 1905 the exports exceeded the imports by 185,440 tons; this year the imports were 55,433 tons more than the exports.

The production of coal in Germany for the four months ending April 30 is reported as below, in metric tons:

	1905.	1906.	Changes.
Coal	35,981,428	45,342,714	I. 9,361,286
Brown coal	16,929,962	18,285,781	I. 1,355,819
Total mined.	52,911,390	63,628,495	I. 10,717,105
Coke made	3,754,967	6,428,148	I. 2,673,181
Briquets made	3,977,936	4,686,618	I. 708,682

The production last year was decreased by the miners' strike.

Iron Trade Review.

NEW YORK, June 13.

The chief feature of the week has been active buying of bessemer and basic pig iron. This has been so large, that the Steel Corporation is reported unable to get the June and July supplies it needs from outside furnaces. Foundry iron is quieter, though there is a prospect of revived demand, as the molders' strike is in process of settlement.

Finished material shows little change, the demand for structural material and plates being especially strong, as for some time past. A little weakness has developed in bars, but it can hardly be expected to last. There is a scarcity of steel billets, and mills which depend on purchased billets are getting anxious. Sheet and tin-plate mills are also in trouble over their supply of sheet-bars.

The railroads are furnishing lots of work, not only in the way of cars, but also in orders for new bridges, terminal buildings and the like.

May movement of Lake iron ore showed only a small decrease, notwithstanding the strike in the first part of the month. June shipments so far are on the largest possible scale.

Birmingham. June 11.

Sales of iron in the Southern territory during the past week were in small lots and, in many instances, require early delivery. There is no improvement in production. The waiting policy on the part of some consumers has not upset the equilibrium of the manufacturers and they are maintaining the prices given out publicly. No. 2 foundry is quoted at $14 per ton, and while it has been stated that this price is being shaded 25 to 75c., very little of this cheap iron can be located. The Tennessee Coal, Iron and Railroad Company has 10 furnaces in blast in this district, half of them, however, being on basic iron. The Republic Iron and Steel Company has two furnaces in blast. The Alabama Consolidated has two, one of which is manufacturing basic iron and selling exclusively to the Southern Steel Company. The Sloss-Sheffield Steel and Iron Company has but four furnaces making iron, with a fifth almost ready. The Woodward has two and the Lacey-Buek has one. There are two other furnaces in the district making iron.

The steel situation continues active. The probable make for the first eight months of the coming year has been sold and there is still some inquiry as to the product. The Southern Steel Company is making preparations to enlarge steel plant at Gadsden, contracts having been let for additional open-hearth furnaces.

J. A. Durfee, general superintendent of the steel and iron plants of the Tennessee Coal, Iron and Railroad Company in the Ensley division, leaves this week for Colorado, where he becomes general manager of the steel department of the Colorado Fuel and Iron Company. As a token of esteem the employees of the Ensley plant presented Mr. Durfee last week with a handsome chest of silver. His successor will be named this week.

The machinery and other equipment of the Weller rolling mills have been removed from Anniston to Gadsden, Ala., and will in the next few weeks be in position to begin operations.

Cleveland. June 5.

Iron Ore—Since the strike was ended, shippers have enjoyed exceptional dispatch at unloading ports, and it is this, together with the fact that a larger fleet has been working the lake trade this year than ever before that has made the big showing of the past month possible. Ore experts predict a movement of ore exceeding 5,000,000 tons for June. Rates are unchanged at 75c. from Duluth, 70c. from Marquette and 60c. from Escanaba.

Pig Iron—The demand for foundry iron is reported active, and an advance of 50c. per ton was established early in the week. Some time ago several of the mills shifted from foundry to bessemer and basic. This action has now caused a temporary scarcity in the foundry market, which accounts for the advance. Iron is selling at $16.50 in the Valleys for No. 2. Prices on bessemer and basic are unchanged.

Finished Material—The market for sheets is reported active at the $2 advance announced a week ago. No. 2 galvanized is selling at 3.55c., and No. 28 black at 2.50c. Pittsburg. Plates are firm at the quotations. Many of the mills are sold up for the first half and are taking orders for the second. Structural steel is in good demand, with somewhat better deliveries. Billets are scarce and mills in a position to make quick deliveries can command premium prices.

New York. June 13.

Pig Iron—Selling has been moderate in foundry iron. Present demand is chiefly for bessemer and basic pig, which are not much dealt in here.

For Northern iron in large lots we quote: No. 1 X foundry, $18.50@19; No. 2 X, $18@18.50; No. 2 plain, $17.50@18; forge, $16.25@16.75. Southern iron is held by the larger companies on the basis of $14 Birmingham for No. 2. For large lots on dock, New York prices are: No. 1 foundry, $18@18.50; No. 2, $17.50@18; No. 1 soft, $18.25@18.50; No. 2 soft, No. 3, $17@17.50; No. 4, $16.25@17; $17.50@18; gray forge, $16@16.50. Basic is held at $19 for Virginia, $18.50 for Alabama and $18@18.25 for Northern. Some concessions are said to have been made on Southern No. 2 foundry; $13.75 and even $13.50, Birmingham, are reported.

Cast-Iron Pipe—Prices are steady, the present basis being $30.50 per net ton for 6-in. pipe in carload lots, at tidewater points. The foundries are full of work and on orders for quick delivery premiums may be asked.

Bars—Business is moderate and prices are lower. For iron bars, 1.595@1.645c. is named, while steel bars are held at 1.645c. tidewater. Store trade is moderate at 1.75@2c. delivered.

Plates—Steel plates are in fair demand. Tank plates are nominally 1.745@1.825c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.745@1.845c., according to width. Sales here are chiefly in small lots.

Structural Material—Prices are nominally unchanged. Beams under 15 in. are 1.845c. for large lots; over 15 in., 1.895c.; angle and channels, 1.845c., tidewater delivery. A large part of the business here is done by jobbers.

Steel Rails—No change in standard sections. Light rails are in steady demand; prices are from $28 for 25-lb. up to $34 for 12-lb. rails. The demand for trolley rails is pressing. The price of $28 for standard sections will extend into 1907. Open-hearth rails are quoted at $29 for standard sections.

Old Material—Business is better and dealers are stiffer in their views. No. 1 railroad wrought is $19@20; No. 1 yard wrought, $17.50@18.50; machinery cast, $14.50@15.50; heavy steel melting scrap, $16@16.50. These prices are on cars, Jersey City or other terminal delivery.

Philadelphia. June 13.

Pig Iron—The chief crude iron products that are meeting with attention at present are basic and low phosphorus iron. There is also a reviving inquiry for the finer grades of foundry iron, in quantities ranging from 500 to 2000 tons. The largest special inquiry submitted a few days ago was for 10,000 tons of foundry iron and it is believed today that arrangements have been made for the delivery of this large lot. There is also some little improvement in inquiry for forge iron because of the depletion of stocks at a number of the larger mills. The general tone of the market is stronger than a week ago. Quotations for No. 1 X foundry are $19@19.50; No. 2 X $18.50@19; No. 2 plain $18.25; standard gray forge $16.50; basic $17.75; low phosphorus $25; bessemer $20.

Steel Billets—In consequence of the improvement in demand above noted for pig iron for steel making there has been an improvement in crude steel and some transactions have been traced up which show that urgent buyers were willing to pay $1 premium for special deliveries. The average price for steel billets is $29 and for forging billets $32.50 is a fair figure.

Bars—A good many buyers of bar iron have let their stocks run down, but they are not at all concerned. The mill owners understanding the situation look upon the present quiet in the market as of no significance and feel confident that a com-

pensating demand will soon set in which will probably fill their mills up. The quotations for bars are 1.68½ for both iron and steel.

Sheets—The retail demand from stores is gradually growing in volume while the business at the mills has for a short time been rather light.

Merchant Steel—Heavy deliveries of merchant steel have been made during the past week, on orders placed about a month ago.

Pipes and Tubes—The tube market is active and deliveries are being made every week on orders heretofore placed. There is a good demand for merchant sizes of pipe.

Plates—The inquiry for boiler and tank work has improved a little from the smaller buyers. There is also a better condition among the larger consumers.

Structural Material—The prosecution of so much building work for cities and terminal work for railroads is bringing to the front quite a batch of inquiry for structural material and the office people are now at work upon these inquiries, which are virtually orders. It is only a question of accommodating buyers and all the necessary accommodations will be worked out.

Old Rails—Old iron rails are being offered by some roads who are prepared at last to pull up their old rails and put down new ones. A trade will be made.

Scrap—The scrap market has fallen into a period of dullness; prices are slightly weaker, and there is an abundant supply.

Pittsburg. June 12.

A heavy pig-iron buying movement has started, and it is estimated that during the past few days fully 150,000 tons of bessemer and basic iron have been sold or negotiations opened which will likely result in sales within a week. Most of the leading steel interests are in the market for third-quarter iron. The Cambria Steel Company has bought 90,000 tons of bessemer and basic on third quarter; the price to be adjusted monthly according to the market. The Pennsylvania Steel Company, is reported to have placed a large order, but the exact tonnage has not been officially announced. The Lackawanna Steel Company is expected to come into the market this week. There is no iron for June shipment, and it is reported the United States Steel Corporation is disappointed in not being able to get all the outside iron it desired. So far the Steel Corporation has succeeded in buying only 2000 tons of bessemer for this month's shipment. For some reason the furnaces are reluctant to announce the sales made, and it is reported that when the contracts now pending are closed there will be scarcely any bessemer iron available for third-quarter shipment. It is believed the corporation will depart from its custom of buying monthly, and will place an order for a big tonnage for the entire quarter. On all large orders the price for bessemer is $17.25, Valley, but on small lots the furnaces demand $17.50 and $17.75. One lot for prompt shipment sold this week at $18, the highest price of the year. The Republic Iron and Steel Company is taking 10,000 tons of bessemer iron monthly, and a week ago placed an order for 10,000 tons for August delivery, having previously contracted for a like tonnage for May, June and July. The Allegheny Steel Company this week bought 5000 tons of basic iron at the minimum rate of $17, Valley, and the Sharon Steel Hoop Company bought 5000 tons of bessemer and 3000 tons of basic for third quarter. Foundry iron is weaker, but furnaces cannot be put on bessemer iron owing to inability to get bessemer ores for this season's delivery. This is due to the fact that at the opening of the season furnaces bought bessemer ore only to maintain their present rate of production, as the unusual demand was not anticipated, and now cannot buy more to change from other grades to bessemer.

The excellent demand for finished steel products continues and there is a remarkable improvement in plates. Some of the steel car making concerns have increased their capacity and their specifications for plates have been correspondingly increased. All are filled with orders for cars for the rest of the year. Contracts for plates and shapes for three new lake vessels have just been placed and the mills will be kept busy on orders booked for at least two months, and indications point to enough business being placed to keep them operating to capacity all year. Orders for structural material are still being placed, but the strike of the bridge and structural iron workers is beginning to be noticed. Work on several large contracts is delayed and unless a settlement is reached soon it is believed some erection work projected for this year will be abandoned. The only apparently unsatisfactory finished lines are iron and steel bars. The demand for iron bars is not good and there are reports of considerable shading, sales being made at less than 1.50c., Pittsburg, and early last month 1.55 and 1.60c. was quoted. Merchant steel bars have been firm at 1.50c. all year, but now it is said some large consumers are holding off for the inside price of 1.40c. made to the agricultural implement makers last April, when contracts were placed for the season beginning July 1. It is reported that one large interest has made the concession, but the report cannot be verified. The demand for sheets and tin-plate, despite the recent advances in price, is very heavy and production is restricted through inability to get sheet-bars and also on account of a scarcity of skilled workmen, due to the hot weather, some plants not having a sufficient force to operate to capacity. The wage conference between representatives of the Republic Iron and Steel Company, and the Amalgamated Association of Iron, Steel and Tin Workers began here yesterday. A satisfactory settlement is expected on the basis reached at the conference with the Western Bar-Iron Association.

Pig Iron—The heavy demand for bessemer iron has made the price firm at $17.25@17.75, Valley furnaces. Basic is strong at $17 and foundry No. 2 is weak at $16, Valley. Gray forge is quoted at $16.35, Pittsburg.

Steel—The demand for bessemer billets has increased and the price is 50c. a ton higher, $27 being quoted. Open-hearth billets remain at $28 and sheet-bars continue scarce, being nominally quoted at $28, but sales at a higher figure have been recorded. Plates are firm at 1.60c. and steel bars remain at 1.50c.

Sheets—The advance of $2 a ton in the price of sheets did not affect the demand, and a number of good orders were placed during the week. The leading producer has secured some large orders for roofing plates for San Francisco. Black sheets are quoted at 2.50c. and galvanized at 3.55c. for No. 28 gage.

Ferromanganese—There is but little change in the market, $80 still being quoted for early shipment; but for third quarter the price is easier, $72@75 being quoted.

BY TELEGRAPH.

Pittsburg, June 13—The Republic Iron and Steel Company has placed an additional order for 20,000 tons bessemer pig with the Bessemer Furnace Association.

Cartagena, Spain. May 26.

Iron and Manganiferous Ores—Messrs. Barrington & Holt report that shipments for the week were one cargo, 6100 tons Calasparra magnetic, to Rotterdam; three cargoes, 8780 tons manganiferous ore, to Great Britain. The iron-ore business continues firm, and any new sales that have been made are reported at increased prices. Were it not for the fall in exchange, there would be every prospect of increased prosperity for the mines in this neighborhood. Unfortunately it must be anticipated that directly consumers are unable to pay the increase in prices necessary to compensate for the difference in exchange, many mines will have to close down their production. This will especially refer to the innumerable small mines, which for many years have practically been working without any profit, notwithstanding the greatest economy.

Quotations are unchanged, at 8s. 8d.@ 8s. 11d. for ordinary 50 per cent. ore; 9s. 2d.@9s. 5d. for special low phosphorus ore; 12s. 1d. for specular ore, 58 per cent.; 10s. 3d. for S. P. Campanil. Manganiferous ores range from 11s. 10d. for 35 per cent. iron and 12 manganese up to

18s. 3d. for 20 per cent. iron and 20 manganese. All prices are f.o.b. shipping port.

Pyrites—Iron pyrites, 40 per cent. iron and 43 sulphur, are quoted at 10s. 8d. per ton, f.o.b. shipping port. Shipments for the week were 130 tons copper pyrites.

London. June 4.

The complete report on mines for 1905, just issued, shows that 17,786 tons of coal were taken from quarries, or open workings. Adding this to the quantity heretofore reported, makes the total quantity of coal produced in the United Kingdom last year 236,128,936 long tons, or 264,464,408 short tons. This is an increase of 3,700,644 long tons, or 1.6 per cent., over the previous year.

The production of iron ore in 1905 was as follows, in long tons:

From mines under coal mines act	7,860,969
From metalliferous mines	1,768,307
From open workings over 20 ft. deep	3,818,302
From shallow pits and surface work	1,143,153
Total	14,590,731

The iron ore imports in 1905 were 7,350,734 tons, making a total ore supply of 21,941,465 tons. Assuming this was all used, it makes an average of 2.29 tons of iron ore used to 1 ton of pig iron made last year. That is, the average productive tenor of the iron used was 43.7 per cent. metallic iron.

Dusseldorf, Germany. June 2.

The German blast furnaces in April turned out 1,010,789 metric tons of pig iron. This was a decrease of 40,738 tons from March—a little more than was due to the shorter month, since the average daily out-turn fell from 33,920 tons in March to 33,693 tons in April. The latter exceeded the earlier months of the year, however, the daily average for February having been 33,428 tons, and for January, 32,854 tons. For the four months ending April 30, the production was as follows, in metric tons:

	1905. Tons.	1905. Per Ct.	1906. Tons.	1906. Per Ct.
Foundry iron	552,801	17.1	690,527	17.2
Forge iron	255,493	7.9	286,966	7.1
Steel pig	205,618	6.4	295,080	7.3
Bessemer pig	113,858	3.5	155,019	3.9
Thomas pig	2,101,213	65.1	2,589,179	64.5
Total	3,228,983	100.0	4,016,771	100.0

The increase in foundry iron was 137,726 tons; forge, 31,473; steel pig—which includes spiegeleisen, ferromanganese, ferrosilicon and all similar alloys—89,462; bessemer pig, 41,161; Thomas, or basic iron, 487,966; the total gain being 787,788 tons, or 24.4 per cent. This large increase is partly due to the light output in the earlier months of 1905 forced by the Rhenish-Westphalian strike.

The steel makers are busy this year, and we hear of some buying of basic pig from the Middlesboro district in England. There is talk of structural steel orders from San Francisco, but no such contracts can be definitely placed as yet; though the Steel Syndicate hopes for business from America.

Pig-iron prices are strong. Bessemer pig is quoted at 82 marks, or $19.52; basic, or Thomas pig, 73m.—$17.37; forge iron, 68 m.—$16.18 for first quality and 58 m.—$13.80 for second; foundry iron, 78m.—$18.56 for No. 1, and 70 m.—$16.66 for No. 3. Spiegeleisen, 10 to 12 per cent, manganese, is 93 m., or $22.13, per ton.

Brussels, Belgium. May 31.

During the first four months of this year there were 37 blast furnaces active in Belgium. For the four months ending April 30, their output was: Foundry iron, 33,526; forge iron, 78,649; bessemer and basic pig, 345,593; total, 457,768 metric tons of pig iron; an increase of 29,770 tons or 7 per cent. over last year.

The current year shows a large increase in exports; especially in pig iron, in blooms and billets, and in structural shapes.

Chemicals.

NEW YORK, June 13.

Copper Sulphate—Quotations remain as last week; ranging from $6.05 per 100 lb. for large lots—carload or over—up to $6.25 for smaller orders. Trade is rather quiet, and little is doing in an export way.

Nitate of Soda—The trade is steady, with fair demand, and little new. The current quotation is 2.30c. per lb. for 96 per cent.; 95 per cent. can be had at from 2.5 to 5c. per 100 lb. less.

Liverpool price for spot nitrate is £11 5s. per ton for ordinary, up to £11 12s. 6d. for refined; the latter quality is scarce at present.

Metal Market.

New York, June 13.

Gold and Silver Exports and Imports.

At all United States Ports in April and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
Apr. 1906	$2,485,552	$14,972,576	Imp. $12,487,024
" 1905	1,303,874	2,581,057	" 1,277,183
Year 1906	22,632,174	25,288,663	" 2,656,489
" 1905	35,319,138	11,803,259	Exp. 23,515,879
Silver:			
Apr. 1906	4,213,687	2,796,626	Exp. 1,417,061
" 1905	2,317,599	2,559,876	Imp. 242,277
Year 1906	23,379,295	15 473,624	Exp. 7,905,671
" 1905	14,930,041	8,075,232	" 6,854,809

These statements cover the total movement of gold and silver to and from the United States. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Movement, New York.

For week ending June 9, and years from Jan. 1.

Period.	Gold. Exports.	Gold. Imports.	Silver. Exports.	Silver. Imports.
Week	$253,400	$ 310,289	$ 949,910	$ 34,233
1906	5,718,521	44,431,197	27,909,550	918,212
1905	33,118,146	5,268,759	14,308,575	1,719,789
1904	63,524,515	3,040,532	18,719,176	379,629

Imports of gold for the week were from Cuba and Central America; of silver, from Mexico and South America. Exports of gold were chiefly to Panama; of silver to London.

The statement of the New York banks—including all the banks represented in the clearing house—for the week ending June 9, gives the following totals, comparisons being made with the corresponding week of 1905.

	1905.	1906.
Loans and discounts	$1,089,520,900	$1,059,162,680
Deposits	1,123,832,800	1,047,135,400
Circulation	46,575,100	48,931,400
Specie	205,462,700	187,129,600
Legal tenders	85,293,000	81,816,300
Total Reserve	$290,787,700	$268,945,900
Legal requirements	280,958,200	261,783,850
Surplus reserve	$ 9,827,500	$7,162,050

Changes for the week this year were increases of $7,619,400 in loans, $4,024,000 in species and $10,384,300 in deposits; decreases of $1,081,900 in legal tenders, $807,800 in circulation and $346,025 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.	Total.
New York	.....	.....	$187,129,600
England	$167,826,855	.....	167,826,855
France	589,168,035	$212,893,295	802,062,330
Germany	189,670,000	63,225,000	252,895,000
Spain	75,680,000	120,750,000	196,430,000
Netherlands	27,610,500	28,768,500	56,379,000
Belgium	16,160,000	8,080,000	24,240,000
Italy	142,875,000	19,817,000	162,692,000
Russia	473,705,000	27,860,000	501,565,000
Austria	232,800,000	64,250,000	297,050,000

The returns of the associated banks of New York are of date June 9, and the others June 8. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York. The New York banks do not separate gold and silver in their reports.

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell as follows for the year to May 31:

	1905.	1906.	Changes.
India	£ 3,031,871	£ 7,613,213	I. £ 4,581,342
China	502,968	.....	D. 502,968
Straits	2,800	1,750	D. 1,050
Total	£ 3,537,639	£ 7,614,963	I. £ 4,077,324

Imports for the week were £392,000 in bars and £137,000 in Mexican dollars; £529,000, all from New York. Exports were £197,500 in bars and £136,000 in Mexican dollars; a total of £333,500, all to India.

Indian exchange is again easier, and the Council bills offered in London were taken at an average of 16d. per rupee. Silver purchases for India are smaller than they have been.

SILVER AND STERLING EXCHANGE.

June.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	June.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
7	4.85⅝	64⅝	29⅞	11	4.86	65	30
8	4.86	65	30	12	4.86	64⅝	29 13/16
9	4.86	65⅛	30 1/16	13	4.86	64¾	29⅞

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	$0.50	$0.53
Peruvian soles and Chilean	0.46	0.49
Victoria sovereigns	4.85⅛	4.87⅛
Twenty francs	3.86	3.89
Spanish 25 pesetas	4.78	4.80

Other Metals.

Daily Prices of Metals in New York.

June	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
7	18⅝ @18⅞	18⅜ @18⅝	85¾	40	5.75	6.05 @6.10	5.87½ @5.92½
8	18⅝ @18⅞	18⅜ @18⅝	86 1/16	40¼	5.75	6.10	5.90 @5.95
9	18⅝ @18⅞	18⅜ @18⅝	.....	40¼	5.75	6.10	5.90 @5.95
11	18⅝ @18⅞	18⅜ @18⅝	86¼	40	5.75	6.15	5.95 @6.00
12	18⅝ @18⅞	18⅜ @18⅝	86¼	39	5.75	6.15	6.00 @6.05
13	18⅝ @18⅞	18⅜ @18⅝	86	38¾	5.75	6.20	6.05 @6.10

London quotations are per long ton (2,240 lb standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usally 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting & Refining Co. for near-by shipments of desilverized lead in 50-ton lots, or larger orders. The quotations in spelter are for ordinary western brands; special brands command a premium.

Copper—The market in general continues exceedingly quiet. Certain interests have made considerable sales, but others report no transactions of consequence. Quotations remain unchanged at 18⅝@18⅞ for Lake copper; 18⅜@18⅝ for electrolytic in ingots, cakes and wirebars; 18⅛@18⅜ for casting copper.

There were no new developments in the London standard market, where prices have remained firm, closing at £86 for spot, £84 10s. for three months.

Refined and manufactured sorts we quote: English tough, £88@£88 10s.; best selected, £89@£90; strong sheets, £98.

Exports of copper from New York for the week were 3198 long tons. Our special correspondent reports the exports from Baltimore for the week at 2907 long tons.

Tin—Both here and in London the market has undergone violent fluctuations, one day being firm and the next day weak and much lower. This state of affairs tended to scare off prospective buyers, but as the market at the close has steadied somewhat, inquiry from consumers has become more satisfactory. The closing quotations are from 38¾@39c. in this market, while London is cabled as £176 10s. for spot, £175 15s. for three months.

Lead is quiet but firm at unchanged quotations. Sales of chemical hard have been made at St. Louis at 5.90, and spot continues to command a premium at New York, being quoted at 5.90@5.95.

The London market was firm throughout the earlier part of the week, but toward the close shows some signs of weakening, the quotations being cabled as £16 17s. 6d. for Spanish lead, £17 for English lead.

The movement of foreign lead in the United States for the four months ending April 30 is reported by the Bureau of Statistics as below, the figures being in short tons:

In bond, Jan. 1	8,148
Imports, four months	29,597
Total supplies	37,745
Re-exports, four months	17,956
In bond, May 1	9,734
Total deductions	27,690
Balance	10,055

This balance, presumably, entered into consumption here.

There have been this year imports of foreign metallic lead in unusual quantity, in addition to the lead imported in ore and base bullion, to be refined here.

St. Louis Lead Market—The John Wahl Commission Company telegraphs us on June 13 as follows: Lead is steady. Missouri brands are selling in a limited way at 5.90c. East St. Louis.

Spanish Lead Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of May 26, that silver has been 13.25 reales per ounce. Exchange is 26.88 pesetas to £1. Pig lead has been 75 reales per quintal; equal, on current exchange, to £15 12s. 9d. per long ton, f.o.b. Cartagena. Shipments for the week were 150 tons desilverized and 510 tons argentiferous to New Castle; 65 tons desilverized lead to Marseilles.

Spelter—The improvement in this metal has made further progress, and the market closes firm at 6.05@6.10 St. Louis, 6.20c. New York.

The London market remained firm throughout the week, but closes steady at a decline of 5s., at £27 10s for good ordinaries, £27 15s. for specials.

St. Louis Spelter Market—The John Wahl Commission Company telegraphs us on June 13 as follows: Spelter is strong a nd largely higher. The latest sales here are on a basis of 6.10c., East St. Louis.

Spanish Zinc Ore Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of May 26, that the market is quiet and steady. Shipments for the week were 1500 tons blende, and 500 tons calamine to Stettin; 960 tons blende to Antwerp; 550 tons blende to Swansea.

Zinc Sheets—The price of zinc sheets is $7.75 per 100 lb. (less discount of 8 per cent.) f.o.b. cars for Lasalle and Peru, in 600-lb. cases for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; and lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since Jan. 1, 1906, have been as follows: Jan. 6, 1906, $8; Feb. 5, $7.75; May 18, $7.65; June 9, $7.75.

Antimony—This metal is entirely neglected, and while quotations remain unchanged, there is no doubt that they would be shaded if actual business presented itself.

Nickel—Quotations for large lots, New York or other parallel delivery, are 40@47c. per lb., according to size and condition of order. For small quantities, prices range from 48c. up to 60c., also according to size of order and deliveries.

Platinum—The current quotation in New York is $25 per ounce. The price, however, is subject to fluctuations, on account of variable supply. Demand is strong and steady.

Quicksilver—The metal is firm and New York prices are still $41 per flask of 75 lb. for lots of 100 flasks or over, and $42 for small lots down to 10 flasks. For retail quantities, under 10 flasks, pound prices are charged, which work out to $43.50@44 per flask. San Francisco prices are firm at $39.50 for domestic orders and $38 for export. The London price is £7 7s. 6d. per flask, but jobbers ask £7 10s. for moderate lots.

Aluminum—List prices of the chief maker are as follows, for ingots: No. 1, over 99 per cent. pure, 38c. per lb. in less than 100-lb. lots, 36c. in lots of 100 lb. up to one ton, and 35c. in ton lots; No. 2, over 90 per cent., 35c., 43c. and 33c., as above. Granulated metal is 1c. per lb. over price of ingots. Rolled sheets from 44c. up, according to size.

Minor Metals—For minor metals and their alloys, wholesale prices are, f.o.b. works.

	Per Lb.
Bismuth	$1.50@$1.60
Cadmium, 99.5% f. o. b. Hamburg	92c.
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Chrome (70)	13½c.
Ferro-Chrome (7-9% carbon, per lb. Cr.)	9@9½c.
Ferro-Chrome (1% C. for ea. 10% Cr.)	10@10½c.
Ferro-Chrome (60-64% Cr., 3-4% C.)	14c.
Ferro-Chrome (60-70% Cr., 1% C. or less)	38c.
Ferro-Molybdenum (50%)	95c.
Ferro-Titanium (20%)	80c.
Ferro-Tungsten (37%)	28c.
Ferro-Vanadium (25-50%) per lb. vanadium contents	$7.20@$7.50
Magnesium, pure (N. Y.)	1.50
Manganese, pure (93@99%) N.Y.	75c.
Manganese—Copper (30@70%) N. Y.	45c.
Molybdenum (98@99%, N.Y.)	$1.70
Phosphorus, foreign red (f.o.b. N. Y.)	1.10
Phosphorus, American yellow (f. o. b. Niagara Falls)	50c.
Tungsten (best) pound lots	85c.
Ferro-Silicon (50%) spot. Ex ship Atlantic ports	$90@$95 ton.

Variations in price depend chiefly on size and conditions of orders.

Wisconsin Ore Market.

PLATTEVILLE, June 2.

By comparison with the conditions of a few weeks past, the present week is more satisfactory. Prices are from $3 to $5 per ton better, with a strong demand from the buyers. The Sandoval people made a strong bid for ore and were kept out to some extent by a hurried raise, on the part of one of the principal buyers. The Gritty Six is making the only really high-grade ore on the Wisconsin market, as the Roosevelt carries 8 per cent. iron after being roasted. Sixty per cent. ore sold on a basis of $43, some lots going as high as $46.50. It is reported, but not confirmed, that the owner of one lot of hand-cobbed ore refused $47 per ton.

Low-grade prices remain the same as last week, as also drybone and sulphur.

The camps of the Platteville district loaded ore as follows in pounds:

Camps.	Zinc, Lb.	Lead, Lb.	Sulphur, Lb.
Platteville	280,790	.....	.....
Linden	374,220	.....	.....
Hazel Green-Buncombe	324,900	.....	.....
Highland	287,680	.....	.....
Cuba City	246,000	.....	.....
Mineral Point	136,560	.....	.....
Rewey	111,000	53,000	.....
Benton	109,830	.....	.....
Harker	105,270	.....	.....
Montfort	.....	.....	69,000
Total for week	1,976,250	53,000	69,000
Year to June 9.	29,336,720	1,604,500	2,852,460

It is generally supposed that ore prices are rising; the larger producers are bearing this fact in mind, and curtailing their output for the present.

Missouri Ore Market.

JOPLIN, June 9.

The highest price paid for zinc was $48 per ton, the assay basis price, where observed, $42 to $45 per ton of 60 per cent. zinc; the average price $41.24.

The highest price paid for lead was $83, at which price a large part of the week's production was sold; medium grades brought $78@82; the average price $81.30.

The zinc market was quiet on the surface up to Thursday, at prices current last week, and in a few instances slight advances, where ore grades were advanced. Friday came a storm out of a clear sky in orders from smeltermen to their agents, to hold their regular patrons, or at least the regular quantity, at any price, while the companies endeavoring to increase their purchases gave similar orders to get the ore. This made the latter end of the week two of the liveliest days that have come to the purchasing agents for many months; and when the smoke was cleared away tonight, the large smelters have secured their usual ore supply at the expense of the smaller ones, and prices were advanced $2 to $5 per ton, medium grades coming in for the greater increase.

Following are the shipments of zinc and lead from the various camps of the district for the week ending June 9.

	Zinc, lb.	Lead, lb.	Value.
Carterville-Webb City	2,144,100	532,040	$67,911
Joplin	2,412,640	264,370	63,917
Galena-Empire	1,147,700	244,350	32,720
Duenweg	735,000	168,590	22,714
Neck City	623,940	.....	14,036
Aurora	631,860	29,290	12,965
Prosperity	168,080	222,060	12,717
Alba	511,070	5,530	11,719
Baxter Springs	396,930	148,330	11,520
Badger	458,740	4,250	10,260
Granby	375,000	70,000	7,371
Oronogo	140,310	14,710	3,502
Zincite	135,140	.....	2,900
Spurgeon	159,150	19,720	2,527
Carthage	66,000	.....	1,485
Sherwood	72,280	3,610	1,844
Totals	10,177,940	1,726,850	$280,108
23 weeks	240,757,840	33,375,450	$6,454,174

Zinc value, the week, $209,895; 23 weeks, $5,188,213.
Lead value, the week, 70,213; 23 weeks, 1,265,961.

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months; the average for zinc being based on the prices of assay basis ores carrying 60 per cent. zinc:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1905.	1906.	Month.	1905.	1906.
January	52.00	47.38	January	61.50	75.20
February	52.77	47.37	February	57.62	72.83
March	47.40	42.68	March	57.20	73.73
April	42.88	44.63	April	58.00	75.13
May	43.31	40.51	May	58 27	78.40
June	40.75	....	June	57.80	....
July	43.00	....	July	58.00	....
August	48.83	....	August	58.00	....
September	46.75	....	September	63.50	....
October	47.60	....	October	63.86	....
November	49.55	....	November	68.67	....
December	49.00	....	December	76.25	....

Mining Stocks.

NEW YORK, June 13.

The market has been slow and inclined to be dull, with some signs of weakness. Occasional advances bore some signs of inside work, and the market did not respond. Amalgamated Copper closed at $107½, while $165 was paid for Federal Smelting common; and $156 for American Smelting common.

The outside market has been dull and sluggish, with only moderate fluctuations, and a tendency to lower prices. Boston Copper, which closed at $30¾, was about the only stock which showed any advance.

On the Consolidated Exchange the larger dealings were in Comstock at 22c.; May Queen at 24@25c.; Little Chief at 6c. Consolidated California & Virginia sold at 87c.; Savage at 75c.; Mexican at 75@76c.; Ophir at $3.75. Sandstorm sold at 70c., while Tonopah, of Nevada, brought $18.50, on a small sale.

Boston. June 12.

It has been an exceedingly quiet week in mining shares. Some few stocks have been active at times, but as a rule prices are lower than a week back, but not materially so.

Boston Consolidated has been well in the foreground. It touched $31 early last week, from which it slid back to $28.25 and closed tonight at $29.25. The fact that it is selling practically on a parity with Utah Copper lends color to the story that the two companies will be consolidated, share for share. United States Smelting took a sudden spurt to $60.75, but reacted to $59.12½ tonight, which is a trifle below a week ago.

Some disappointment was expressed that the Utah Consolidated dividend was not increased from the $2.50 rate, and it was reflected by weakness in the stock. The close tonight is $1.75 below last week, at $61.12½.

Something of a surprise comes in the report that the Quincy Mining Company contemplates increasing its capitalization, although it was not reflected in the price of the stock materially, which is off but $5 to $95. Tamarack broke $10 to $90 on a very small offering of stock, but recovered $8 of it on a much smaller amount. Atlantic rose $1 to $14.50, but has lost most of it. Victoria touched $8.50 and good things are said of the company now that the 500-ton mill is in operation. On heavy trading Raven Mining broke from $4 to $2.50 on the curb, recovering to $3. It is reported that the Anaconda's use of the Buffalo shaft by Raven will not be allowed any longer, which will necessitate the sinking of its own shaft. It is also reported that Amalgamated is to take over the Raven property and close it down. Arizona Commercial touched $50 on the curb. Davis-Daly Estate Copper sold on the curb at $13.50. The subscription price is $15, less $2.50 for underwriting. The allotments will not be known until after June 20, but it is known that the stock is well taken.

Colorado Springs. June 8.

The market was quite active during the fore part of the week, but quieted down considerably toward the close. There has been but little fluctuation in prices, even during the heavy trading, and those stocks that did advance have now returned to practically the same price as they were selling for seven days ago.

Jennie Sample has been the heaviest trader, and sold as high as 10¾, and as low as 9¾, but closed today at 10⅜c. Elkton has been quite active around 44, and reached as high as 47, but closed today at 45c. The high point for El Paso was 48c., but it was traded in today at 45c. Portland sold down to $1.49 but closed at $1.50. Vindicator sold during the week for 94c. Work is selling for 10; Findley for 75; while 24½c. was paid for Isabella.

San Francisco. May 7.

Business continues on the revived exchanges in a moderate way, which is about all that could be expected at present. The public has too much on its hands to do much speculating nowadays. However, there is promise of better things, and it is wise, at least, to keep matters going.

The Comstocks are dull, the more active market being in the Tonopah and Goldfield shares.

New Dividends.

Company.	Payable.	Rate.	Amt.
American Sm. & Ref	July 16	$1.75	$875,000
American Sm. & Ref., pfd	July 2	1.75	875,000
Copper Range Con	July 2	1.25	477,226
Daly West	June 15	0.60	108,000
Guggenheim Expl	July 2	1.75	183,750
Horn Silver	June 30	0.05	20,000
Maryland Coal, pf	June 30	4.00	75,400
Mohawk Copper	July 10	3.00	300,000
National Lead	July 2	1.00	149,054
Republic Iron & St., pfd.	July 2	3.75	765,634
St. Mary's Min. Land	July 2	1.00	150,000
Tezuitlan Copper	July 2	2 00	20,000

Assessments.

Company.	Delinq.	Sale.	Amt.
Alameda, Idaho	June 11	July 9	$0.04
Chollar	July 10	July 30	0.10
Dobson Pass, Idaho	June 19	July 19	0.01
Exchequer	July 11	Aug. 1	0.05
Lower Mammoth, Utah	June 16	July 31	0.05
Mexican, Nev	July 10	July 31	0.15
New Era, Cal	June 16	Aug. 1	0.02
Tetro, Utah	June 7	July 2	0.02
Utah & Montana, Utah, June 4		July 4	0.00½

Tonopah Stocks June 13.

(Revised by Weir Bros. & Co., New York.)

	High.	Low.	Last.
Tonopah Mine of Nevada	20.00	20.00	20.00
Tonopah Montana	2 84	2.80	2.82
Tonopah Extension	9 00	8.75	9.00
Tonopah Midway	2.12	2.07	2.10
Tonopah West End	2.60	2.60	3.60
Goldfield Mining Co	.46	.45	.46
Jumbo Mining	1.25	1.25	1.25
Red Top	1.55	1.55	1.55
Sandstorm	.70	.65	.70
Montgomery Shoshone Cons	15.75	15.25	15.50
Eclipse-Bullfrog	.88	.88	.88
Denver-Bullfrog	1.60	1.60	1.60

St. Louis. June 9.

Adams, $0.40—$0 25; American Nettie, $0.15—$0.10; Center Creek, $2.20—$2.00; Central Coal and Coke, $65 00—$64.00; Central Coal and Coke, pfd., $80.00—$79.00; Central Oil, $60.00—$55.00; Columbia, $5.00—$2.00; Con. Coal, $23.00—$21 50; Doe Run (old stock), $350.00—$325.00; Granite Bimetalic, $0.25—$0.20; St. Joe (old stock), $32.00—$30.00.

LONDON. (*By Cable.**) June 13.

Dolores, £1 16s. 3d.; Stratton's Independence, £0 4s. 6d.; Camp Bird, £1 0s. 0d.; Esperanza, £3 17s. 6d.; Tomboy, £1 5s. 8d.; El Oro, £1 5s. 8d.; Oroville, £0 18s. 0d.; Somera £0 4s. 4½d.; Utah Apex £1 8s. 8d.

* Furnished by Hayden, Stone & Co., New York.

COLORADO SPRINGS.

Name of Company.	High	Low		Sales
Acacia	.11	.11	.11	....
C. C. Con	.04¾	.04⅝	.04⅝	....
Elkton	.44½	.43½	.43½	....
El Paso	.45	.43	.43	....
Findlay	.74⅞	.74⅞	.74	....
Isabella	.24¾	.23¼	.23¼	....
Mollie Gibson	.04½	.04⅜	.04½	....
Nevin	.03½	.03½	.03½	....
Pharmacist	.04⅜	.04	.04	...
Portland	1.49	1.47½	1.47½	....
Vindicator	.89¾	.80	.85	....
Work	.10	.09⅞	.09⅞	....

SAN FRANCISCO.

Name of Company.	High	Low	Clg	Sales
Best & Belcher	.90	.80	.82	650
Caledonia	.55	.45	.45	2,200
Chollar	.16	.08	.08	1,900
Con. Cal. & Va	1.05	.85	.86	5 050
Crown Point	.06	.03	.03	2,900
Gould & Curry	.24	.11	.12	5,400
Hale & Norcross	1.05	.87	.87	850
Mexican	.96	.71	.71	3,200
Ophir	4.40	3.70	3.70	2,770
Overman	.17	.08	.08	4,000
Potosi	.17	.09	.09	1,400
Savage	1.05	.80	.80	4,250
Sierra Nevada	.26	.20	.20	8,900
Standard Con	2.00	1.75	1.75	
Bullfrog Mining	.45	.38	.40	12,000
Diamondfield	.41	.37	.37	17,000
Jim Butler	1.27½	1.20	1.25	5,000
Kendall	.70	.68	.70	600
MacNamara	.86	.73	.75	12,100
Manhattan Dexter	.79	.62	.65	8,300
North Star	.50	.40	.40	10,000
Original Bullfrog	.15	.13	.14	17,000
Tonopah Belmont	5.37½	5.25	5.37½	2,520

STOCK QUOTATIONS.

NEW YORK. Week June 12

Name of Company.	High	Low	Clg.	Sales
Amalgamated	110⅜	107⅜	108⅛	309,585
Anaconda	273	267½	268	104,900
Balaklala Mining	15⅝	14	14	
British Col. Copper	8⅛	7⅝	8	1,920
Butte Coalition	34	33⅞	33⅞	2,255
Cum. Ely Mining	7¼	6¾	6¾	13,500
Greene Gold	3¾	3¼	3¼	1,630
Greene Gold & Silver	2⅞	2¼	2¾	4,526
Guanajuato	5¾	5⅜	5¾	3,750
Micmac	4½	4¼	4⅜	7,576
Mines Securities	¼	¼	¼	400
Mitchell Mining	8¾	6⅞	7⅝	5,075
Nev. Utah M. & S.	4⅛	3⅞	4	6,330
Nipissing Mines	5⅛	5¾	5⅛	22,800
Tennessee Copper	43⅞	43¾	43¾	300
Union Copper	1 1/16	1⅛	1⅛	10,000
Utah Apex	6⅛	6	6⅛	575

NEW YORK INDUSTRIALS.

Am. Smelting & Ref	159⅜	154⅝	155⅞	77,650
Am. Smelting & Ref., Pf.	120	119	119⅛	2,100
Bethlehem Steel	32¾	30½	31	6,354
Colo. Fuel & Iron	62½	54¾	56⅝	120,950
Federal M. & S., Pf.	99¾	97	97	3,465
Inter. Salt	35	33⅝	33⅝	2,700
National Lead	78⅛	76⅛	76⅛	6,871
National Lead, Pf	101¾	100¾	101	2,865
Pittsburg Coal	14	14	14	1,200
Republic I. & S.	31¼	29	30⅛	30,400
Republic I. & S., Pf.	105¼	104	104⅛	8,200
Sloss-Sheffield	81	78¼	79	3,300
Tenn. C. & I	157½	155	157⅛	1,700
U. S. Red. & Ref	40½	38	39¼	8,300
U. S. Red. & Ref., Pf.	84	81	83¼	5,000
U. S. Steel	42	40½	40¾	148,250
U. S. Steel, Pf.	107⅛	105⅞	105⅞	37,000
Va. Car. Chem	42⅞	40¼	41¾	10,615

* Ex. div.

These stocks, not elsewhere quoted, had the following range of prices during the week: (New York) Atlanta, .19½—.18; Bamb. Delamar, 7; Comstock, .23—.22; Gugg. Exp, 284¼; Mont. Sho. Con. (New), 16—15¾;; St'd Oil, 620—615. (Boston) Ahmeek, 80—78; Ariz. Com'l, 51½—47; Black Mt., 9¾—9½; Cal. & Pitts., 31½—30; East Butte, 10¾—10½; Keweenaw, 12½—10½; Lake S. & Pitts., 33—30; Pitts. & Dul., 21—20; Majestic, 1⅝—1½; Raven, 4½—2⅞; Shawmut, 1½—1⅛; Superior Cop. 13; Troy, 2¼.

BOSTON.

Adventure	6¼	5¾	6¼	735
Allouez	39¾	37⅞	38¼	1,675
American Zinc	9½	9⅛	9½	
Atlantic	14½	13⅝	13⅝	1,010
Bingham	34¾	32	32	1,885
Boston Consolidated	31	28¾	29¼	28,237
*Calumet & Arizona	114¾	113¼	113¼	342
*Calumet & Hecla	695	695	695	59
Centennial	24	23	23	391
*Copper Range	79¼	76¼	76¾	2,278
*Daly-West	17	15¾	16	1,463
Franklin	18⅝	18	18	808
Granby	12⅝	12	12½	2,001
Greene Consolidated	26¾	25¼	25½	4,474
Isle Royal	20¼	20	20	560
Mass	8	7¾	8	255
Michigan	13⅛	13	13	350
Mohawk	67	66½	66⅞	923
Mont. Coal & Coke rcts.	3⅛	3¼	3¼	300
Nevada	19⅜	18½	19	10 240
*North Butte	94⅜	90½	90⅜	5,910
Old Dominion	42½	41¼	41¼	780
Osceola	111½	110	110½	1,156
*Parrot	29½	27½	27⅜	1,527
Quincy	98	98	98	19
Rhode Island	5½	5	5	1,060
Shannon	9	8¼	8½	5,005
Tamarack	100	95	95	58
Tecumseh	12¼	11¼	12	970
Trinity	9½	9	9	850
United Copper, com.	64½	63⅜	63⅞	3,519
U. S. Oil	12	11¼	11¾	229
U. S. Smg. & Ref	60¾	59⅛	59⅛	16,092
U. S. Smg. & Ref., pfd.	47	46⅛	46⅜	3,453
Utah Copper	63	61⅛	61⅜	3,312
Victoria	8½	7⅞	8	1,200
Winona	7	6½	6⅜	230
Wolverine	137	136½	136½	35

PHILADELPHIA.

Name of Company.	High	Low	Clg.	Sales.
American Cement	7½	7¾	7½	342
Cambria Steel	36¼	35	36	6,468
General Asphalt	39	39	39	90
Penn. Steel, pd	106	106	106	57
Philadelphia Co	52	51	51	1,587
Tonopah Mining	20	18⅛	19⅞	3,650

PITTSBURG.

Crucible Steel	13¼	13¼	13¼	460
Crucible Steel, Pd	80¾	80	80⅜	750
Harbison-Walker Ref.	11⅛	11⅛	11⅛	350
Ohio Tonopah	.33	.28	.28	5,200
Tonopah Ext	10	9	9	200

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1905.	1906.	1905.	1906.
January	60.690	65.288	27.930	30.113
February	61.023	66.108	28.047	30.464
March	58.046	64.597	26.794	29.854
April	56.600	64.765	26.108	29.984
May	57.832	66.976	26.664	30.968
June	58.428	.....	26.910	.....
July	58.915	.....	27.163	.....
August	60.259	.....	27.822	.....
September	61.695	.....	28.528	.....
October	62.034	.....	28.637	.....
November	63.849	.....	29.493	.....
December	64.850	.....	29.977	.....
Year	60.352	.....	27.839	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.			
	1905.	1906.	1905.	1906.	1905.	1906.
Jan	15.008	18.310	15.128	18.416	68.262	78.896
Feb	15.011	17.869	15.136	18.116	67.963	78.147
March	15.125	18.361	15.250	18.641	68.174	81.111
April	14.920	18.375	15.045	18.688	67.017	84.793
May	14.627	18.457	14.820	18.724	64.875	84.867
June	14.673	.....	14.813	.....	65.881	.....
July	14.888	.....	15.005	.....	66.887	.....
Aug	15.664	.....	15.725	.....	69.830	.....
Sept	15.965	.....	15.978	.....	69.667	.....
Oct	16.279	.....	16.332	.....	71.406	.....
Nov	16.599	.....	16.758	.....	74.727	.....
Dec	18.328	.....	18.398	.....	78.993	.....
Year	15.590	.....	15.699	.....	69.465	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan	29.325	36.390	July	31.760	.....
Feb	29.262	36.403	August	32.866	.....
March	29.523	36.662	Sept	32.095	.....
April	30.525	38.900	Oct	32.481	.....
May	30.049	43.313	Nov	33.443	.....
June	30.329	.....	Dec	35.835	.....
			Av. year.	31.358	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan	4.552	5.600	July	4.524	.....
Feb	4.450	5.464	Aug	4.665	.....
March	4 470	5.350	Sept	4.850	.....
April	4.500	5.404	Oct	4.850	.....
May	4.500	5.685	Nov	5.200	.....
June	4.500	.....	Dec	5.422	.....
			Av., year.	4.707	.....

Prices are in cents per pound. The London average for January, 1906, was £ 16.850 per long ton; February, £ 16.031; March, £ 15.922; April, £ 15.859; May, £ 16.725.

SPELTER.

Month.	New York.		St. Louis.		London.	
	1905.	1906.	1905.	1906.	1905.	1906.
Jan	6.190	6.487	6.032	6.337	25.062	28.225
Feb	6.139	6.075	5.989	5.924	24.594	25.344
Mar	6.067	6.209	5.917	6.056	23.825	24.563
April	5.817	6.078	5.667	5.931	23.813	25.781
May	5.434	5.997	5.284	5.846	23.594	27.000
June	5.190	.....	5.040	.....	23.875	.....
July	5.396	.....	5.247	.....	23.938	.....
Aug	5.706	.....	5.556	.....	24.675	.....
Sept	5.887	.....	5.737	.....	26.375	.....
Oct	6.087	.....	5.934	.....	28.225	.....
Nov	6.145	.....	5.984	.....	28.500	.....
Dec	6.522	.....	6.374	.....	28.719	.....
Year	5.882	.....	5.730	.....	25.433	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

ABRASIVES—		
Bort, nominal	carat,	$25 to $75 & up.
Carborundum, f.o.b. Niagara Falls, powd	lb.	.08
Grains	"	.10
Corundum,	"	.07@.10
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, in kegs: Turkish flour	"	.03½
Grains	"	.05@.05½
Naxos flour	"	.03½
Grains	"	.05@.05½
Chester flour	"	.03½
Grains	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½
Grains, in kegs	"	.02½
Garnet, per quality,	sh. ton	25.00@35.00
Pumice Stone, Am. Powd.	lb.	.01 3-5@.02
Italian, powdered	"	.01½@.01⅝
Lump, per quality	"	.04
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ACIDS—		
Acetic 28%	lb.	.02¼@.02¾
Boric	"	.10@.11
Hydrofluoric, 30%	"	.03
" 48%	"	.06
" 60%	"	.11
Hydrochloric acid, 20°, per lb		1.25@1.50
Nitric acid, 38°	per lb.	4.25@4.62½
Sulphuric acid, 50°, bulk, per ton		$12 up.
60°, 100 lb. in carboys		.87½@1.12½
60°, bulk, ton		16.00@20.00
66°, 100 lb. in carboys		1.00@1.25
66°, bulk, ton		18.00@21.00
Oxalic	"	.06@.06¼
ALCOHOL—Grain	gal.	2.45@2.47
Refined wood, 95@97%	"	.70@.75
ALUM—Lump	100 lb.	$1.75
Ground	"	$1.80@1.85
Chrome Alum	lb.	0.05
ALUMINUM—Sulphate, com'l.	"	1.25@1.60
AMMONIA—24 deg. lb		.04½@.05½
" 26 " "		.05
AMMONIUM—		
Bromide	lb.	.23
Carbonate	"	.07½@.08
Muriate grain	"	.05⅝@.06¼
Lump	"	.09½
Sulphate, 100 lb		$3.05@$3.12½
Sulphocyanide com.	"	.30
" " chem. pure	"	.40
ANTIMONY—needle, lb		14@16c.
ARSENIC—White (nominal)	"	.05½@.07
Red	"	.06½@.06¾
ASPHALTUM—		
Barbadoes	per ton.	40.00@100.00
West Indies	"	20.00@60.00
Egyptian	lb.	.09@.10
Gilsonite, Utah ordinary	per ton.	40.00@60.00
Trinidad	"	25.00@30.00
California	"	18.00@24.00
BARIUM—		
Carb. Lump, 80@90%	sh. ton.	28.00
92@98%	"	30.00
Powdered, 80@90%	lb.	.02@.02½
Chloride com'l	ton.	$33@$35
Nitrate, powdered, in casks	lb.	.06
Sulphate (Blanc Fixe)	"	.02
BARYTES—		
Am. Crude	sh. ton.	11.00@13.00
Crude No. 2	"	13.00@15.00
Floated	"	17.00@19.00
Foreign floated	"	19.00@21.00
White	"	17.00@19.00
BISMUTH—Sub-nitrate	lb.	1.50
BLEACHING POWDER—35%, 100 lb.		$1.25@1.50
BLUE STONE—(copper sulphate), carload, per lb		.06@.06¼
BONE ASH	lb.	.02½@.02½
BORAX	"	.07½@.07½
CALCIUM—Acetate, gray	"	2.35@2.40
Acetate, brown	"	1.60@1.65
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton.	65.00
Chloride, f.o.b. works	"	9.00@10.00
CEMENT—		
Portland, Am. 500 lb.	bbl.	1.55@1.60
Foreign	"	1.60@2.00
"Rosendale," 300 lb.	"	.85
(in sacks)		.65
Slag cement	"	.75@1.25
CHROME ORE—		
(50%) ex-ship N. Y.	lg. ton.	18.50@19.00
Bricks, f.o.b. Pittsburg, M.	"	175.00
CLAY, CHINA—Am. common ex-dock, N. Y.	"	$8 up.
Foreign	"	12 up.
COBALT—Oxide	lb.	2.50
COPPERAS—Bulk	100 lb.	$0.47½
In bbls	"	.57½
In bags	"	.52½
CRYOLITE	lb.	.06½
FELDSPAR—Ground	sh. ton.	10.00@12.00
FIRE BRICK.		
American	per M.	20.00@30.00
Imported	"	26.00@45.00
St. Louis No. 1	"	16.00
" No. 2	"	14.00
Extra	"	20.00@23.00
FIRE CLAY.		
St. Louis mill,	per ton	2.50
FLUORSPAR—		
Domestic f.o.b. shipping port:		
Lump	sh. ton.	8.00@10.00
Ground	"	11.50@13.50
Gravel	"	4.25@4.50
Foreign crude ex, dock		8.00
FULLER'S EARTH—Lump	100 lb.	.75
Powdered	"	.85@1.25
GRAPHITE—		
American, ore, common	lb.	.01@.10
Artificial	"	.06
Ceylon, common pulv	"	.02½@.03½
Best, pulverized	"	.04@.08
German, com. pulv	"	.01½@.01½
Best, pulverized	"	.01½@.02
Italian. pulverized	"	.01@.02
GYPSUM—Ground	sh. ton.	12.00@20.00
Fertilizer	"	7.00
Rock	lg. ton.	4.00
English and French	"	18.00@22.50
INFUSORIAL EARTH—		
Ground Am. best	"	39.00
French	"	56.00
German	"	58.50
LEAD—Acetate (sugar of)	lb.	.07½@.09⅜
Nitrate, com'l	"	.07½@.08
MAGNESITE—Greece.		
Crude (95%)	lg. ton.	7.00@8.00
Calcined	sh. ton.	30.00@40.00
Bricks, domes, per qual. f.o.b. Pittsburg	M.	160@200
MAGNESIUM—		
Chloride, com'l	lb.	.01@.01½
Sulphate (Epsom salt)	100 lb.	.80@1.10
MANGANESE—		
Crude powdered:		
70@75% binoxide	lb.	.02
75@85% binoxide	"	.02½
85@90% binoxide	"	.03½
90@95% binoxide	"	.05½
Ore	sh. ton.	35.00@45.00
MARBLE—Flour	sh. ton.	8.50
MINERAL WOOL—		
Slag, ordinary	"	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
MONAZITE SAND—		
Guar. 97%, with 5% Thorium oxide, nominal	lb.	.14@.15 and up.
NICKEL—		
Oxide, crude, lb. (77%) for fine metal contained		.47
Sulphate, single	lb,	.18@.20
" double	"	.11½@.12
NITRATE OF SODA—100 lb. 96% for 1906		2.37½
95% for 1907		2.30
95% for 1908		2.22½
96% is 5c higher per 100 lb.		
OZOKERITE	lb.	11½
PAINTS AND COLORS—		
Litharge, Am. powdered	"	.05½@.06¼
English glassmakers'	"	.08½@.08⅝
Lithopone	"	.03½@.07
Metallic, brown	sh. ton.	19.00
Red	"	16.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02½@.03
French, washed	"	.01½@.02½
Paris green, pure, bulk	"	.21@.23
Red lead, American	"	.06½@.06½
Foreign	"	.08½ up.
Turpentine, spirits	gal.	.62@.63½
White lead, Am., dry	lb.	.06½@.06½
American, in oil	"	.06½@.06⅝
Foreign, in oil	"	.09½ up.
Zinc white, Am. extra dry	"	.04½@.04⅔
Foreign, red seal, dry	"	.06@.08½
Green seal, dry	"	.06½@.09½
PHOSPHATES—Acid		.65@80c per unit
*Fla., hard rock		$9.00@9.50
land pebble		5.00@5.25
†Tenn., 78@80%		4.50@5.00
78%		4.00@4.25
75%		4.00@4.50
68@72%		3.50@4.00
‡So. Car. land rock		4.00@4.25
" " river rock		3.75@4.00
POTASSIUM—		
Bicarbonate crystal	lb.	$0 08½
Powdered or granulated	"	.14
Bichromate, Am.	"	.08½@.08½
Scotch	"	.08½@.08½
Bromide	"	.16
Carbonate (80@85%)	"	.03½@.04½
Caustic, ordinary	"	0.4½@.05½
Elect. (90%)	"	.05½@.06½
Chloride (muriate), lb		1.9@1.98c.
Chlorate, powdered	"	.09½ and up
Crystals	"	.08½@.09½
Cyanide (98@99%)	"	.18@.19
Kainite, long ton, bulk, $8.50; bags, $9.50.		
Permanganate	lb.	.09½@.10
Prussiate, yellow	"	.15@.16
Red	"	.35@.38
Sulphate	100 lb.	2.18½@2.21½
PYRITE—		
Domestic, non-arsenical, furnace size	per unit	11½@12c.
Domestic, non-arsenical, finer, per unit		9@10c.
Domestic, arsenical, fines		8½@9c.
Imported lump, non-arsenical, per unit		11½@12c.
Imported furnace size, non-arsenical, per unit		12@12½c.
Imported lump, arsenical, per unit		11@11½c.
" furnace size, arsenical, per unit		11½@12c.
Imported fines, arsenical, per unit.		8½@9c.
" " non-arsenical, per unit		10@10½c.

Pyrite prices are per unit of sulphur. On lump deliveries, a charge of 25c. per ton is made for breaking to furnace size.

SALT—N. Y. com. fine 280 lb. bbl.		.72@1.18
N. Y. agricultural	sh. ton.	$3@4.40
SALTPETER—Crude	100 lb.	4.25@4.50
Refined, crystals	"	5.00@5.50
SILICA—		
Ground quartz, ord'ry	sh. ton	9.00@10.00
Best	"	12.00@13.00
Lump Quartz	"	2.50@4.00
Glass sand	"	2.75
Infusorial earth, crude		25.00
Calcined and floated		32.00
SILVER—Nitrate, crystals	oz.	.41½@.44
SODIUM—		
Acetate	lb.	.04¼@.04½
"Alkali," per lb., future 58%		.90@1.12½c.
" " " prompt		1.00@1.20c.
Soda ash, 48%, per lb		1.2@1.3c.
Bicarb. soda, per lb		1.3@1.5c.
Soda, caustic, per lb., 78%		1.9@2c.
" " powdered		2⅛@3c.
Salt cake, per 100 lb		.70@.85c
Sal soda, per lb		.6@1.4c.
Soda, monohydrate, per lb		1.2@1.3c.
Bichromate	lb.	.06½@.06½
Bromide	"	.21
Chlorate, com'l	"	.08½@.09½
Cyanide, ("100% KCN")	"	.18@.19
Hyposulphite, Am	"	1.50@1.75
German	"	1.75@2.00
Phosphate	100 lb.	1.80@2.00
Prussiate	"	.09½@.09½
Sal soda, f.o.b. works	100 lb.	.60
Foreign, f.o.b. N. Y.	"	.85
Silicate, com'l	100 lb.	.70@1.00
Sulphate, com'l, (Glauber's salt)	100 lb.	.45@.60
" " calcined		.70@.85
STRONTIUM—Nitrate	lb.	.07⅞@.08½
SULPHUR—		
Louisiana (prime) to New York, Boston or Portland	ton	$22.12½
To Philadelphia or Baltimore	"	22.62½
Roll	100 lb.	1.85
Flour	" "	2.00
Flowers, sublimed	" "	2.20
TERRA ALBA—	100 lb.	.60@1.00 & up.
TALC—Domestic	sh. ton.	15.00 and up
French, best	"	25.00
Italian, best	"	35.00 and up
TIN—Bi-chloride, 50%	lb.	11½c.
Crystals	"	25c.
Oxide, lb		47@52c.
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic ch. pure	"	.07@.09½
Chloride solution, com'l	"	.02½@.02½
Chloride, granular	"	.08
Dust	"	.05½@.06
Sulphate	"	.02½

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

Note—These quotations are for wholesale lots in New York, unless otherwise specified, and are generally subject to the usual trade discounts. Readers of THE ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.